IVC Course Code : 324

# PRINTING TECHNOLOGY First Year

(w.e.f. 2018-19)

# **Intermediate Vocational Course**

- Paper I : DTP & Pre-Press 1
- Paper II : Press Work & Finishing 1
- Paper III : Introduction to Computer System



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PART-A		Theory		Practicals		Total	
		Periods	Marks	Periods	Marks	Periods	Marks
1	General Foundation Course	150	50	-	-	150	50
2	English	150	50	-	-	150	50
PART-B							
3.	<b>Paper – I</b> DTP & Pre Press-I	135	50	135	50	270	100
4.	<b>Paper –II</b> Presswork & Finishing - I	135	50	135	50	270	100
5.	<b>Paper –III</b> INFORMATION TECHNOLOGY& C	135	50	135	50	270	100
6.	OJT	-	-	365	100	365	100
	Total	705	250	770	250	1475	500

## VOCATIONAL COURSE 1<sup>st</sup> YEAR & 2<sup>nd</sup> YEAR I YEAR PRINTING TECHNOLOGY COURSE

On the Job Training : November and December

### **EVALUATION OF ON THE JOB TRAINING:**

The "On the Job Training" shall carry 100 marks for each year and pass marks is 50. During on the job training the candidate shall put in a minimum of 90 % of attendance.

The evaluation shall be done in the last week of January.

### Marks allotted for evaluation:

S.No	Name of the activity	Max. Marks allotted for each activity
1	Attendance and punctuality	30
2	Familiarity with technical terms	05
3	Familiarity with tools and material	05
4	Manual skills	05
5	Application of knowledge	10
6	Problem solving skills	10
7	Comprehension and observation	10
8	Human relations	05
9	Ability to communicate	10
10	Maintenance of dairy	10
	Total	100

**NOTE**: The On the Job Training mentioned is tentative. The spirit of On the Job training is to be maintained. The colleges are at liberty to conduct on the job training according to their local feasibility of institutions & industries. They may conduct the entire on the job training periods of I year and (450) II year either by conducting classes in morning session and send the students for OJT in afternoon session or two days in week or weekly or monthly or by any mode which is feasible for both the college and the institution. However, the total assigned periods for on the job training should be completed. The institutions are at liberty to conduct On the Job training during summer also, however there will not be any financial commitment to the department.

# **PRINTING TECHNOLOGY**

# Paper - I

# DTP & PRE-PRESS - 1

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# UNIT 1

# **Design for Printing**

## **Structure:**

- **1.1 Basic Principles of design**
- **1.2 Typography**
- 1.3 Layout
- I.4 Identifying Principles of Design with Example
- **I.5 Working with Illustrations**

### **Learning Objectives:**

On completion of this unit the student shall be able to

- > To understand design and its concepts
- $\succ$  To know the need for design
- > To learn the functions of design
- > To understand the characteristics of design
- > To learn page layout margins Gutter margins
- ➤ To learn working with Illustrations

#### **1.1 Basic Principles of Design**

#### **Design**:

Design is a creative thought, a plan or an idea formed in the mind. It is a language of vision that serves as a motivating factor which brings all the elements together. Design is the process of creating, evaluating, selecting and arranging the elements in a systematic way. The elements include reading matter illustrations, decorating parts and white space in and around the printed matter which makeup a printed job. Design can also be defined as a noun and as a verb with reference to;

#### Design as a noun

**Project :** plan, strategy, proposal, policy, scheme

Drawing : blueprint, plan, sketch, outline, model, layout

Pattern : motif, figure, shape, device, outline

**Intention :** purpose, scheme, plan, object, aim, target, goal

#### Design as a verb

Create : invent, conceive, originate, fabricate, draw up, construct

Plan: intend, aim, devise, propose, suggest, idea

**Need for Design:** The translation of speech into writing entails a loss of vocal inflections, facial expressions and gestures. One of the main objects of design in printing is to compensate this loss by organizing the visual properties of the printed word to communicate with the greatest efficiency. Thus, design in priming is an aid to communication. In general, we all can create but only a few consciously use this ability. Some people are instinctive designers with innate ability but most of us only access, analyze and enjoy the best designs made by others. A good design is always natural but not contrived. It will flow and not get in the way.

#### Main functions of a design

**Communication:** Any design must make the viewer to stop and look at it or read it (design is the initial contact and the text is read after wards) Hence the design must be communicated effectively to the viewers.

**Entertainment:** Design must be aesthetically pleasing as we see little enough beauty and a lovely image which is source of great pleasure.

**Guidance:** As said earlier the design must flow and should not get in the way. Like a magician the designer should guide the viewers to make a flow around the design invisibly.

**Creator:** The designer must rouse interest in the viewers. He must manipulate the graphic skills and available data in such a way that the design must be appealing to the reader's self-interest and psychology. He must create a voice in the readers in an identifiable and familiar way. He must create a voice in the readers in an identifiable and familiar way. He must create a voice visually through typefaces, layouts, style and content. He also should lay utmost importance on focus i.e. he should make the viewer to move around the page without taking the eyes straight to the stress point but lead via other interesting points along the way.

**Researcher:** the designer should read the minds of the viewers. He should communicate the design in a different way that it should register in the minds of the readers. He should bring together many types of elements for his clients.

#### 1.1.1 Characteristics of a design

- The design must be simple and consistent
- The design must be methodical in setting up
- It should be like a journey and the route must be with places of interest and the design should be deemed to be acceptable
- It must excite the eyes of the viewers with shapes
- Use right size of type with right face, family and style. The type face and style establish the voice of the design's text
- Grids act as anchors. They give the page a good structure. They prevent the elements from drilling away
- Avoid thicker straps at the top of the page as they act as a curtain rail. Type, pictures and Other elements appear to hang from it
- If there are no photographs give typographical stress to the design
- The visual codes should work strategically
- Use page furniture to add interest and guidance to the design
- Break the monotony with latest items
- Divine up the page using classical proportions
- The designer is a guide and he should take the reader by hand and lead
- The design should have contrast in texture and shapes in the page
- Use white space creatively to give a feeling of lightness, not a lack of Text

- Margins act as a frame to the page and set up margins carefully
- The design should have perfect alignment to give a feeling of structure

## **1.2Typography:**

**Introduction:** Typography means the art of expressing ideas in type. It has a long and honorable history dating back to the middle ages. It is an arcane and fascinating subject and owing to its venerable age typography still uses some arcane terms and measuring systems. Text composition in the earlier five centuries was considered as the 'black art'. This is a critical element in our work and is the basic building block of the text. Through the ages type designers have created a variety of typefaces, series, styles and families some timeless some unique some contemporary. With so many exciting old and new typefaces around us, the more we understand. get to know their characteristics and work with the type, the better our typography will become. The type we chose establishes the voice of our design.

- a. The first rule of typography is restraint
- b. The second rule is consistency
- c. The third rule is legibility

The clarity of characters, shape of the letters, density and spacing contribute to the overall 'ease' in a design. The type designers are vigorously trained in the psychology and science of reader's perception. And hence the type designers blend science with art to produce typefaces that combine aesthetic appeal and effective communication so as to first capture and then retain the interest of the readers. The variety of typefaces permit the typographer unlimited creative freedom. Any image can be impacted by type face selection; solidity, refinement, glamour, strength, festivity or seriousness. Type setting is a superior medium for conveying a message. Type setting is more memorable, type set paragraphs are remembered longer and understood better than type written matter.

#### **1.2.1 Principles of Symmetrical Arrangement**

The most obvious principle in design is balance which falls under two forms, center Balance or symmetrical balance and off-center, balance-asymmetrical balance. Symmetrical balance is the equilibrium of opposing forces.

In symmetrical balance, each line is centered on the measure.

Placing identical objects (weight) on each side of a center line, this system is used in situations that demand dignity, formality and strength.

Use different sized objects they will appear imbalance. A small item placed in the foreground will balance a larger item placed in the back ground.

Formal balance occurs when each object on the right side has an exact counterpart on the left side relative to size placement, shape, colour. Each side has equal power to attract attention, equally forceful in demanding the customers action.

Centered design creates a feeling of performance, stability and authority as well as of tradition. A designer would use formal balance for a company that wants to appear very stable and secure. Book title pages, documents, certificates and business visiting cards are designed in symmetrical style.

#### **1.2.2 Principles of Asymmetrical Arrangement**

Informal balance or off-center consists of unequal weights and spaces on either side of the measure. In asymmetrical arrangement, images create a sense of balance by asset of size, weight and position of the elements. In asymmetrical design the side weighing the most will be on the left side, since the upper right side is the end of the eye's path.

Sometime two or more visual objects of same weight are used instead of identical objects to create balance.

If a large child tries to balance with a small child while playing on a see-saw the large child would have to move near to the centre, like wise if we have groups of type or art of unequal size, the larger unit should be placed near to the optical centre the smaller one. A heavy black at the top of the page should be balanced near the bottom by types or art. Asymmetrical arrangement may be flush left or right style.

Asymmetrical balance can result in more subtle and imaginative arrangements. This method is used when the designer wishes to provide activity, excitement and variety.

**Readability:** Readability is the quality of the design that makes the type comfortable to read. Readability is that characteristic which makes it easy and pleasant to read.

Readability is a factor that makes the type comfortable to read.

Readability is the result of a complex balance of factors - size, style, weight, line, length, spacing, setting and format. Bodoni is more readable (diagonal strokes tend to conflict the reader). Bold faces are more readable than light, condensed fonts are more readable than the extended fonts. Ultra Bodoni is least readable style.

Typographer has three choices for readability:

- 1. The face itself
- 2. The line length and

3. The spacing between and within lines. Readable face is big on the slug-large 'x' height.

A good type should be invisible. Reader should grasp entire words without being aware of individual letters. Type should have a pleasant texture-overall tonal value must be dark enough to the eye, need not strain.

Proper proportion: we can see a pumpkin better than a goose egg-a printer says. It means round is better and easier to read than oval shape.

#### Factors affect readability and ways to improve it

1. The styles: Type face-familiar or usual type style is most readable. Time Roman world famous face, easily read.

2. The size: Larger faces for better Reading 9-12 points are. acceptable.

3. Line length: Narrow columns better than wider columns, eye blinks every 6 seconds.

4. The amount of leading between lines- leading 1-4 point between lines, minimum 3 points is better.

5. The contrast between type and paper, more contract is better. Type set in bold is tiring but we depend on contrast for easy reading

6.Type and paper relationship: matching paper and type and ink decides readability. Dull paper-thin face gives less readability and bright or coated paper medium face improves readability.

7.Condensed faces lose readability full space should be selected.

8.Reverse type: Dark back ground advisable, light reaches for the image are identified.

9.Use of capital letters: Top portions of lower case is easy to distinguish at distinctive.

10.Justification: Flush left arrangement is preferable, eye is not annoyed. Flush right should be carefully used when there is little text as in the case of advertisement. Eyes are windows of the mind. Designs which are set by the eyes can have an in erasable impression on the mind.

Long lines in small type also impair legibility since the reader is slowed in picking up the succeeding line after swinging back from the ends of the long line.

#### 1.2.3 Application and importance of Legibility and Readability

By legibility we mean the visibility of the letters. Legibility is the measure of clarity of the letter forms. Type face design is a factor of legibility. Legibility is the quality of type that makes it easy to read

Legibility may be defined as ability to read continuously with possible speed, accuracy, pleasure, with the best possible effort. Legibility is defined as the capacity of text to be read by the reader with ordinary speed and accuracy and without any due effort of strain. Legibility is the important quality of the typographer's work. Chief factor in the choice of type for the text and shape of the letter must be clear to the reader. The word legibility means "plain and easily made out" the word 'stop' on the highway sign is a excellent example of legibility.

Printing is the vehicle. Legibility is the well greased bearing that allows the wheels of senses to revolve without squealing. Legibility research shows that the reader actually looks, most closely at the top halves of letters. Typographer should choose types whose top halves are as identifiable as possible.

Advertising typography: The average person will spend 10 seconds for looking at an advertisement and will read less than 10% of it. The more words there are in an advertisement, the fewer the average person will read. More copy will be read on verso pages than on recto pages.

**Children's books:** Fifth standard students read 10-12pt and larger sizes for under 10 years old. Black type printed on white paper is more legible with a yellowish tone. Bright white paper coated or art paper meant for halftone reproduction is not conducive to easy reading, colour combinations difficult to read.

**Display type:** Type sizes ranging from 14-30 pt, more size needs more white space to increase legibility.

**Figures:** Numbers are less legible than letters. Arabic numerals are more legible than roman numerals and numbers written. Readers prefer tables over diagrams, tables should be set in a least 8pt, one pica white space between each tabular column.

Indents: 2-3cm indents easier to read.

**Justified or unjustified:** Justified composition gives a pleasant appearance and comfort for the reader as can be seen in novels. Unjustified composition may not affect the speed of reading but is often used in official correspondence or in text in advertisement. Production cost for ragged right considerably less than justified compositions.

**Letter Spacing and word spacing:** Space between letters helps the reader to differentiate between characters and improve letter recognition. For letter spacing, the width of lowercase is the best choice.

Line spaces 1 to 4pt are preferred. The optimum 1pt space for 1 opt faces of medium 'x' height and width is 2/3pts, depending on the type face-bold face must he line spaced greater than lighter variation. More space between lines than words is general rule.

Inches	Inches Decimal	Picas	
1/32	.03125	Op2.25	
1/16	.0625	Op4.5	
3/32	.09375	Op6.75	
1/8	.125	Op9	
5/32	.15625	Op11.25	
3/16.	1875	1 p1.5	
7/35	.21875	1p3.75	
1⁄4	.25	Op6	
9/32	.28125	1p8.25	
5/16	.3125	1p10.5	
11/32	.34275 1p12.75		
3/8	.375	2p3	
13/32	.40625	2p5.25	
7/16	.4375	2p9.75	
15/32	.46875	2p9 <sup>.</sup> 75	
·5		3p	
.7/32 .53125		3p2.25	
9/16	.5625	3p2.25	
5/8	.625	3P9	
21/32	.65625	3P11.25	

Legible faces Sanserif, Caslon, optima and century school book. Sanserif faces have highest legible quality.

11 / 16 .6875			4P1.5		
.71875			4P3.75		
3/4 .75			4P6		
25 / 32 .781		125		4P8.25	
13 / 816	.812	5		4P12.75	
Inches		Inches Decimal		Picas	
menes		menes Deennar		1 Icas	
27 / 32		.84375	4F	P12.75	
27 / 32 7 / 8		.84375 .875	4F 5F	212.75 23	
27 / 32   7 / 8   29 / 32		.84375 .875 .90625	4F 5F 5F	212.75 293 25.25	
27 / 32   7 / 8   29 / 32   15 / 16		.84375 .875 .90625 .9375	4F 5F 5F 5F	212.75 23 25.25 27.5	
27 / 32   7 / 8   29 / 32   15 / 16   31 / 32		.84375 .875 .90625 .9375 .96875	4F 5F 5F 5F 5F 5F	212.75 23 25.25 27.5 29.75	

#### **Points and picas**

The basic units of measurement in design are points and picas. You use points to measure type size. Headlines are measured in points. When you dummy a headline on a page, however, you must convert points to picas because pages are dummied in picas and sometimes column inches. A column inch is one inch of type over one column.

There are 12 points in a pica. If you divide the point size of a headline by 12, you get the number of picas. For example, if you have a 48-point headline and want to know how many picas to allow for it, take the following steps:

- Because there are 12 points in a pica, divide 48 by 12 to get the no. of picas
- 48/12=4 picas.
- Dummy 4 picas for a one-line, 48-point.

Sometimes, you have more than one line of a headline. To determine how many picas to allow on your dummy, you first must multiply the size of the headline by the no of lines. If you had a two-line, 48-point headline, you would do the following.

- Multiply 48 by 2 because you have two lines.
- 48 x 2=96 points.
- Divide 96, the total points, by 12, the number of points per pica.

- 96/12=8 picas.
- Dummy 8 picas for a two-line. 48-point headline.

You also can use the headline dummying chart when determining the number of picas to allow for headlines of various point sizes and number of lines.

Sometimes, you must dummy a story that is measured in inches. There are 6 picas to an inch.

Here is how you would deal with a 10-inch story:

- Because there are 6 picas to an inch, multiply 10 by 6 to get the number of picas for the story.

-  $10 \ge 6 = 60$  picas.

- Dummy 60 picas for your 10-inch story.

Text is measured in picas and points. The standard width for one column of text on a six-column grid is 12 picas and 2 points. The fact that points are measured on a 12-points scale, i.e. 12 points to a pica. But the solution is simple: convert the points to a decimal when doing math. You convert to a decimal by dividing the number of points by 12, the number of points in a pica. After you have done the math, convert back into points.

#### **1.2.4 Difference between point system**

A point is measure of a font size. This unit comes from old ages of typography and nowadays is slightly distorted because of "simplified" computer typesetting technique. It is usually considered to be 1/72 of an inch which is not always true.

Typography is an old art and has developed over the years a bewildering variety of mutually incompatible units. The old Roman foot/inch system did not offer originally a unit fine enough for typography, so a whole set of special purpose ad hoc units were created in various regions of the world. Some of them became obsolete while others are still used widely. The problem is that different countries use different (but similar) units adding to the great confusion.

Here is a list of different font measurement units used in different fields of typography to measure lengths and font sizes:

- 1 point (Truchet) = 0.188 mm (obsolete today)

- 1 point (Didot) = 0.3759 mm=1/72 of a French Royal inch (27.07 mm)=about 1/68 inch

- 1 point (ATA) = 0.3514598 mm = 0.0138366 inch.
- 1 point (TEXT) = 0.3514568035 mm = 1/72027 inch
- 1 point (Postscript) = 0.3527777778 mm = 1/72 inch
- 1 point (I' Imprimerie, national, IN) = 0.4 mm

Two most widely used point units are ATA point (also known as Anglo-Saxon point) and Didot points. Anglo-Saxon point which is about 1/72.272 has been used on the island of the United Kingdom and on the American continent. The second point variant is the Didot point which is used in Europe. This point unit is named after the French printer Francois Ambroise Didot (1730-1804) who defined the "point-based" typographical system now bearing his name.

Both systems define another unit of measurements of length equal to 12 respective points. It's pica in Anglo-Saxon system and Cicero in Didot system:

- 1 pica (ATA) = 4.2175176 mm = 12 points (ATA)
- 1 Cicero = 4.531 mm = 12 point (Didot)
- 1 pica (TeX) = 4.217517642 mm =12 points (TeX)
- 1 pica (Postscript)= 4.233333333 mm = 12 points (Postscript)

It is worth mentioning that the name of the unit of Cicero comes from the ancient Roman lawyer and member of the senate, Marcus Tullius Cicero [106 BC —43 BC) who is remembered as a master of speech and who became most famous for his disclosure of the Catalina conspiracy against the emperor of Rome.

As you can see, a point for 18 points used in America is smaller than that used in Europe. This difference could be as much as 1 point for 18 point font. This poses some problems as many software products don't take this into account and are only oriented on the American market. Using these products in Europe causes the fonts in publications to become smaller than it is used to be. Some programs though support multiple measurement system. For example, QuarkXPress allows specifying point/inch and Cicero/cm ratio. Other software like Cowl Draw allows to enter values specifying explicitly the measurement system — "pt" for ATA point and "dd" for Didot points.

Some countries are making attempts to abandon the archaic point system and use the well-established, consistent and globally accepted metric system. Metric typographic units are already used in Japan and to some degree in Germany and other European countries. However, the market dominance of US-originated typographic software without proper support for metric units at all levels currently hinders the further deployment of metric typographic practice.

Metric typography as described in the new German draft standard DIN 16507-2 works roughly as follows: absolutely everything is measured and specified in millimeters. Dimensions are multiples of 0.25 mm, or where a finer resolution is required multiples of 0.1 or 0.05mm. No more points, picas, Cicero, inches etc. and all their awful conversion factors. There is nothing wrong with continued use of font specific units such as the cm, as these are relative length measurements.

#### **1.3 Layout**

A printed product or job must be well planned. The combination of ideas used in planning and designing the product is called a layout. It can be defined as the arrangement of all the units of elements into a printed, usable format. These units or elements include the heading, sub-heading, text matter, illustrations and photographs. The preparation of a complete set of layouts will require: thumb nail sketches, rough, and a comprehensive layout. A definite plan, predetermined, is very necessary.

#### **1.3.1 Values of good planning**

Graphic planning allows the designer to review and revise his or her thoughts. Printed work is often completed in less time and each person who performs a mechanical function leading to the final product known their job. Questions are kept to a minimum.

Spelling, wording, and the placement of material must be accurate, otherwise the final product will have little value. The specifications of the client for their printed material must be accurately met. This will result in a high-quality final product and the client, commercial printing plant management and the skilled workers will be satisfied that their work has fulfilled a particular requirement.

#### **1.3.2 Pre-layout planning**

A pre-layout planning form should be completed to help formulate the ideas of the person who is going to originate the printed job. Each of the 12 questions that follow should be recorded for reference during the layout preparation.

- 1. Objective of the product: What is the purpose of the finished product? Is it to sell? Inform? Reference?
- 2. Target group: Will the printed material be for personal use, for scientists, for teenagers or for some other group? The design approach would be different for each.
- 3. Personality of the product: Should it be sophisticated, gaudy, dignified, humorous or have some other quality? The type of paper, typography and illustrations depend on these decisions.

- 4. Style of the finished product: Will it contain photographs? Will it be strictly typographic or will it contain cartoons, illustrations or a combination of both?
- 5. Layout format: Will the product be a booklet, folder, bulletin, brochure, pamphlet or an entire book?
- 6. Approximate trimmed dimensions: What will be the physical size of the printed product? This will affect which standard paper size can be used.
- 7. Approximate number of pages: Will there be one sheet printed on only one side or on both sides? Will a sheet be printed on both sides and folded? Will there be several pages?
- 8. Approximate number of copies: The number of copies desired often determines the printing process used.
- 9. Finishing and Binding requirements: Will the printed sheets from the press or duplicator need to be trimmed, folded, scored or bound together by one of several methods?
- 10. Layout required: Does the customer require thumbnail sketches, a rough layout and a comprehensive layout?
- 11. Estimated hours for completion: How long will it take to complete the entire job? The answer to this question will depend on the answers to the ten previous questions and will assist in making a cost estimate.
- 12. Approximate date of completion: This involves consideration of the time available per day, and the number of hours or days required.

#### **1.3.3 Layout Procedure**

The sequence followed for preparing graphic layout materials is drawing thumbnail sketches, rough layout and comprehensive layout. Several thumbnails sketches are usually prepared. This selection is made by the person who is ordering the product.

The rough layout is made up of the thumbnail sketch chosen. This layout is generally the same size as the final product and contains all the copy and illustrations. Alternation can be easily made between the thumbnail sketch to the rough layout and again between the rough and the comprehensive layout.

The comprehensive layout is based upon the general arrangements of the thumbnail sketch and the rough layout. This is a precision layout which permits the customer to see what the final product will look like. The overlay sheet generally attached to the base sheet is used to indicate how the final product should be produced.

#### **1.3.4 Design and layout considerations**

Copy analysis is the first essential when designing a job. Thorough knowledge of the job is needed, and then the operation will simply become one of mixing brains with type and/or illustrations.

Thoroughly understand the meaning of the copy before attempting actual work. Study the copy, analyze it. It is time well spent.

To hit upon the correct formula there are certain considerations that must be kept in mind. They are in the following brief points.

- 1. Planning is important.
- 2. Design and layout are essential to obtain a quality finished product.
- 3. Make it readable. A printed product is designed to give information.
- 4. A layout is a blue-print, a master plan.
- 5. Compose the final product in the appropriate media, then arrange to compose it with the actual type, illustrations and photographs.
- 6. Simplicity is important.
- 7. Knowledge of type and typography is necessary
- 8. The printer's point system must he understood.
- 9. Basic design principles must be understood.
- 10. Knowledge of colours and its effect on people are important.

#### 1.3.5 Thumbnail sketches

Thumbnail sketches are simple idea sketches which will help the designer to obtain an attractive and acceptable final result. The client can see the ideas and then choose the layout which he or she prefers.

Thumbnail sketches serve these three primary purposes they:

- 1. Graphically preserve ideas;
- 2. Visually portray ideas; and,
- 3. Compare two or more ideas visually.

Preparation of these sketches should begin immediately after the desired product has been selected and after completion of the pre-layout planning sheet. Copy selection precedes thumbnails therefore; one of the responsibilities of the designer is to obtain all the copy that will appear on the final product. The originator of the planned printed product should have this information readily available.

#### Method of preparation

- 1. Prepare the pre-layout planning sheet and list the copy.
- 2. Choose the final size of the printed product and plan to sketch the thumbnails, in correct proportion, one —quarter size.
- 3. Select the copy elements needing emphasis. Block and shade areas of space in the approximate position that each element is desired. The space given should be a representation of the desired final size.
- 4. Use straight line to represent type that is 12-pt or smaller in size. Do not necessarily use lettering for either the large or small type.
- 5. Outline the space for illustrations or photographs. Within this space, sketch the illustrations or content of the photograph. This permits another person studying the sketched to obtain a basic idea of the content. Detail is not needed for thumbnail sketches of illustrations or photographs.

It is important to sketch several ideas from which a final selection can be made. Skilled designers prepare at least four thumbnails for any copy given to them. Don't be afraid to prepare as many thumbnail sketches as you have ideas. It is often difficult for the beginner to visualize large numbers of varied possibilities.

#### **Rough Layout:**

The second major step in any layout procedure involves the preparation of a rough layout. This layout is an improvement or refinement of a thumbnail sketch, or even a combination of two or more of these. The purposes of a rough layout are

- 1. Force a selection of one of the several sketched ideas;
- 2. Begin refining a specific idea; and,
- 3. Provide a tangible item that can be studied and changed.

A rough layout can be considered a pre-final product. Therefore, in many cases, it can be used as the basis for the final product without the need to produce a comprehensive layout. In many instances, it will be necessary to produce at least two rough layouts, for client approval and comparison.

#### Method of preparation

- **1.** Study the several thumbnail sketches that have been prepared.
- **2.** Select the one that best presents the content of the final two-dimensional product. Selection can then be made by the designer and/or the client.
- **3.** Obtain a sheet of paper that allows for the layout to be drawn in full size.
- **4.** Refer to a type specimen book and select the type font(s) you intend to use in the design.
- **5.** Block or outline the area that will be devoted to type and illustrations according to the thumbnail (or combinations of them) selected.
- **6.** Letter all type within the rectangular outlined areas, based on the copy. Use straight lines to represent the x-height of 12-pt type and smaller.
- **7.** Sketch the illustration(s) within the outlined areas. They should be of a higher quality and contain more detail than a thumbnail sketch illustration. The rough layout should reasonably resemble the finished product.
- **8.** Study the rough layout makes any additions/changes. Consult the client of the final product as this gives the client the opportunity to suggest changes if necessary.

#### **Comprehensive layout**

The comprehensive layout is the most important step in the production of a printed work. It is the master plan or blue-print of the finished product and therefore, its value cannot be overemphasized. It allows the designer and the client to see the finished product and to make changes if necessary.

After the designer and the client have made all the necessary decisions, the comprehensive layout will contain all the information needed to guide specialists who will produce the final product.

#### **Method of preparation**

- 1. Study the rough.
- 2. If the complete material is to be multi-coloured, choose the colours and the content for each. Use coloured pencils or making pens to represent the colour of each element.
- 3. Letter all type in the exact position desired. Make the type look like the actual kind.
- 4. Line should be used to designate the correct position, even if the layout contain 12-point type or smaller. However, the typewritten copy should be attached.
- 5. Draw the illustrations carefully in the correct position.
- 6. Block the space for the photograph(s) or the illustrations(s), if they are used, and attach the glossy print if it is available. If the photographs have not yet been taken,

give directions as to the content, and where the subject or photograph contents can be obtained.

- 7. Prepare an overlay sheet to protect the finished layout after all content has been placed on the layout.
- 8. Thoroughly review the layout. Be certain that you have included all copy and given full production information on the overlay sheet.

A designer is primarily concerned with the layouts or plans of work to be carried out. Most designs involve two very different completed layouts. One may be the carefully drawn and coloured finished comprehensive (colour visual) for the client, the other is visually much simpler, but technically more detailed. This second layout, referred to as either the working layout, the printers' layout, or the composing room layout, is for the printer and serves as the equivalent of the architects working drawing.

#### **1.4 Identify Principles of Design with Example:**

While arranging various elements on a page many principles are to be followed to make the design totally successful. However, there are no 'dos' and don'ts' in any design excepting guidelines. The following are the important principles.

Visually, there is very little originality in design-it is usually a rearrangement of an idea observed and recorded previously. No matter how simple the design may be, there are certain principles that must be applied. Appreciation of their importance will be slowly gained by observation and practice together with good judgment. This will produce satisfactory results without the need for the mathematical calculations.

Principle of design incorporated in any graphic design should always project to assist its communicating and graphic interest however, in the planning of a basic design, the designer must produce a job to suit the class of work, the copy, and the tastes of the customer

The sense of design uses three 'eyes'

**Visual — eyes:** Examine closely all types of printed material, i.e. physically see/look at what everyone else is/has done. (what catches or eludes our attention, and why?)

**Critic —eyes:** separate the good from the bad. That is the points which catch the eyes should be separated from trivial point and also what provokes the ad? What motivates us? Etc....

Inlay - eyes: select the element that makes it a good design.

There are three essential qualities needed to become a competent designer:

**Vision:** to be able to detect an idea and then to toss it around in your head (objects, tones, shapes, colours -- everything around you).

**Imagination:** to be able to use an idea effectively, i.e. think the idea and bring it to a state where it can work.

**Judgment:** to be able to assess the idea's value and correct place and use, i.e. limitations always arise after you come up with an idea.

#### **1.4.1 Principles of Design**

The principles of design are qualities or characteristic inherent in any art form, such as balance, contrast, unity, harmony, rhythm, texture, line, shape, repetition, geometric Centre, Optical center, variety, and action. These principles must be used in any design if it is to be in any way effective. Not all of them, however, will be used in the one design. Whatever principles the designer may adopt, the ultimate result must be a design that can be easily read and clearly understood. Careful control of the principles of design is necessary to successfully project an intended image.

**Balance:** the most obvious principle of any design is balance. It is balancing the opposite sides an axis of one or more elements by very similar elements. Balance is the equilibrium of opposing forces. if falls under two forms i.e. center balance and off-center balance.

**Center Balance:** This is also called symmetric balance, static balance and also formal balance. In center balance the page is marked vertically, horizontally and diagonally in to two parts and all the elements are centered to page size in such a way that what is put on the left half of the page should Wight equal to what is put on the right half of the page similarly what is put on the top half of the page should weigh equal to what is put on the bottom half of the page. Traditional book work used to consist double opening for designating purpose. And a piece of traditional book typography would be built around the center fold or the spine with the type areas and the page margins arranged in a symmetric fashion. Chapter headings and display parts used to be centered to the type area horizontally. Formal balance produces a dignified effect which is more peaceful, creates a feeling of permanence.

**Off-Center Balance:** This is also called informal balance, asymmetric balance and dynamic balance. Balancing opposite sides of an axis with dissimilar elements or contrasting elements is informal and is dynamic as this will have the quality of motion. It is a balance of unequal forces placed at unequal distances from the center. This is based on a teeter — totter or a see — saw where a large mass can be balanced by a small mass placing at unequal places from the center or from the point of balance.

Asymmetric balance is adapted for advertisements, greeting cards, display works, catalogues, letter heads and modem book title pages etc. This balance is dynamic, interesting but produces restlessness and monotonous effects. White space plays a paramount role in this balance in maintaining pleasing equilibrium. Informal balance is active and draws the attention of the readers quickly and effortlessly.

**Contrast:** Contrast is one of the most important elements of all modem design. It is pleasing difference. It gives variety. Variety stimulates interest and rouses excitement. It is like a tree in a flat kind of vegetation. Contrast is used to attract the attention of the reader. It avoids getting monotonous. Using of differed sized and weights of type brings this effect. A change in a colour would arrest the attention of the readers. This can also be achieved by reversing the letters

(ex: printing on black background with white letters) sometimes contrast is also used to shift the eye of the readers from one element to the other.

Of all the design principles, contrast is probably the next most important. Contrast creates interest in the printed product by providing variety in design. An expressive voice will emphasize a word or phrase by raising or lowering the tone, or by increasing or decreasing the speed of delivery. The contrasting tones of the voice in speech give expression and life to the words spoken. In music, a sharp or flat that is outside the primary tonality is a modest but definite emphasis. Contrast is achieved by various ways and means.

a) Contrast of size	b) Contrast of weight c) Contract of position
d) Contrast of form	e) Contract of structure f) Contrast of colour
g) Contrast of chrome	h) Contrast of value i) Contract of texture

j) Contrast of direction.

**Contrast in size:** This is achieved when a large letter id followed by a word or words which have about the same weight as a unit of the large type. This also results when a word set in large type is followed by a line set in smaller type which has the same weight. Effective contrast is not possible when there is too much of difference among the sizes and the smaller elements will be unable to break through and contribute its share.

**Contrast in weight:** most popular type faces of today have a no. of companion letters such as bold, Italic, and Extra Bold. The careful use of type families within a design can add visual interest for the reader in addition to providing visual guides, or cues, to a change of thought or item of importance.

Contrast achieved by varying the type styles must be carefully plan, otherwise the end result will be too much contrast which only defeats itself If you try to emphasize everything, you only gain a monotony of emphasis resulting in a visually confusing design. **Contrast in position:** The very act of placing any design style (formal or informal) on the slant will cause the design to be in visual contrast to the normal horizontal position. As a general rule, the placing of such designs on a slant is not a desirable practice, although in some cases it proves to be very effective. Nevertheless, ease of reading must always be considered, and tilted designs might cause some inconvenience to many individuals who read it.

An alternate method which can often result in a visually dynamic layout is to position the design elements of the page in such a way as to obtain contrast from the white space which surrounds all of these elements.

**Contrast in shape:** Trying to put a square peg into a round hole is an impossible task because the shapes are at contrast to each other. This principle can be incorporated into a design where the visual elements are deliberately arranged to be in conflict to each other.

This may be achieved in variety of ways. e.g. introducing graphics and/or illustrations that differ from the normal proportion of the page, using an extremely large display face that appears to dominate the body text, page itself, or illustrations, incorporating a stunning border or thick rule within the design.

**Contrast in colour:** The concept of contrast in colour should not be limited to the narrow perspective of natural colours, i.e. red, blue, purple, green, yellow, etc. certainly, the use of colour opposites will achieve contrast in a design. For example the use of a colour opposite, together with a colour which harmonizes with the substrate.

It should also be considered in relation to the colour of the typesetting, i.e. the degree of blackness that hits the eye, Careful selection type of both size and weight, will give a distinctive visual colour to the overall design. The use of contrast should be handled carefully because it can cause the layout to become too forceful and thus alter the personality of the product or idea.

**Harmony:** Harmony is 'pleasing agreement'. It is the effect of blending together all the typographic elements to give a uniform impression, tone, colour, texture, size and proportion etc. Harmony can be achieved through various means; Harmony is the opposite of contrast and relates to the unity of all parts in the design.

- (a) Shape Harmony
- (b)Tone Harmony
- (c) Colour Harmony

**Shape harmony:** when type is placed on paper, it should harmonize with the sheet. The shape of the type page should harmonize with the shape of the paper. If a wide face of type on a narrow page is used, it will not be pleasing as there will not be

dimensional relation between type face and shape of the page. Condensed type face suits will on a narrow page whereas extended type requires a wider page. Shape harmony is achieved that type masses and illustration (s) conform to the shape of the design.

**Tone Harmony:** Tone Harmony on a printing page is a achieved when elements such as type, illustrations, borders and initial letters have a uniform tone. If any of these elements has a darker tone than the rest the printed page looks spotty. Dark sports are permissible only when emphasis is required to certain portion of the page. Tone harmony is achieved by equines of the weight of typefaces, decoration and illustrations.

**Colour Harmony:** when is design is to be printed in more than one colour combinations which are pleasing to the eyes only should be used. A monochromatic harmony uses more tones of one colour (tints or shades) when printing on a coloured paper. The effect will be pleasing if the colour used is a shade of the coloured paper, ex: Deep blue colour on a pale blue coloured paper or deep green colour on a pale green colour on a pale blue coloured paper or deep green colour on a pale green colour to another, i.e. stock and ink, two-colour job.

Treatment in harmony is achieved by relationship of type face design, decoration, or border, to the product or idea being sold.

**Texture:** Texture of the body refers to its density. Texture can provide contrast on a page. Lower case letters printed with capital letters produce of contrast of texture as these fabrics have a thick thread. "Texture" is the repetition of each individual character. We will get a texture which can be composed to that of plain weave. Texture is a communicating device.

Line: The typographic line is always a rectangle, long and narrow. The typographic line has two basic attributes in design-texture and weight. The line can be real as well as imaginary words, sentences in themselves form lines. The line shows direction and movement. The lines take the eye to the verbal areas at the bottom. The typographer has the operation of knitting his line together tightly or loosening them up by reducing and increasing leading.

**Shape:** Lines articulate shapes. Groups of words can form shapes. Shapes may be rectangle on what we look at these basic shapes. Square, circle and triangle. Each shape psychologically suggests its own meaning. We call certain "dull", people "squares", we speak of the "love-triangle". The circle suggests peace, protection and safety-shape is an expressive element, shapes are selected to suit the mood of message

to give pleasure. In general, curves are better than straight lines or mixtures of straight and curved shapes are more natural and less used.

**Colour:** There are three terms describing type faces as weight, shading and colour, colour refers to the general impression of the type. Colour refers to the weight of the type face. Type faces are bold, medium and light, the bold type is very dark in colour, medium and lighter faces are less in colour. Light faces look gray heavier more weight faces look black wholly.

**Unity:** unity means oneness. It is bringing relationship between type face and other elements such as illustrations, borders, decorating elements and white space. Unity is an essential that without it all the elements and white space. Unity is so essential that without it all the elements lead to confusion, as type face must fit the illustration, heavy borders call for bold type face such as universal roman and clean line drawings. Unity in other words is an orderly arrangement of various elements which bolds the page together.

**Repetition:** The word repetition indicates identical. In design, it is the repetition of identical elements at regular intervals in a job that creates a visual rhythm to reach a point Repetition can be of two types (a) Exact repetition and

(b) varied repetition.

**Exact Repetition:** repetition of identical elements at regular intervals without any change from the first element. Sensation would be increased by exact repetition. However, it is dull and irritating.

**Varied Repetition:** when various sizes, shapes tones or effects of the elements are introduced it sounds for varied repetition. This is found mostly in advertisements. When one element is larger than the next varied repetition is rhythmical.

**Emphasis:** Giving a special treatment to certain important point i.e. focal points in a design is called emphasis. The matter which is given a special treatment will draw the attention from rest of the elements as it stands out separately demanding viewers' attention. Emphasis creates a special interest and brings into focus the most important parts of the design.

**Rhythm:** If the eye is directed by the lines or objects on a page, the design can be said to have rhythm. This principle is followed to move the eyes smoothly without placing any strain on the mechanism of the eyes and readily from one point to another **point** and returning to the central focal point. Rhythm may be primary which a matter of flow or rhythm may also be secondary which is a matter of symmetrical repetition.

**Optical Centre:** The optical centre is a place or a position little above the geometric centre in a page, it may be roughly about 2/5<sup>th</sup> or 3/8<sup>th</sup> from the top. A geometric centre is dividing a page equally in horizontal, vertical and in diagonal directions of the page.

#### **1.5 Working with Illustrations:**

Illustration is a decoration or visual explanation of a text, concept or process, designed for integration in published media, such as posters, flyers, magazines, books, teaching materials, animations, video games and films.

Different styles of text settings and lettering for layouts

The amount of leading in each piece of text setting is usually decided by one or more of the following.

- The nature of the work;
- The design of the particular type face;
- The body size of the type;
- The x-height of the type;
- The weight and colour of the type; and,
- The measure to which the type is set.

For example, a light type with a small x-height or a medium type with large x-height would need to be treated quite differently



#### Fig:1.1

**Summary:** The chapter deals with four key topics viz; Basic Principles of Design, Typography, Layout and identifying principles of design with examples. The basic principles of design give the fundamental idea of how to go about preparing a design keeping these principles in mind. Though the designer is always given freedom for his creativity, he is still expected to follow the principles of design so that it is acceptable to readers who may differ with each other in their perception.

Since text plays a very important role, typography is another key area which has been dealt at length in the chapter. It enables the designer to know the basics, and measurements of type so that text is properly displayed in any design. Two main aspects of typography viz; legibility and readability are explained in detail. Though both the terms sound similar, there is a fine line of definition to each term. While legibility deals with the ease with which you read, readability deals with the comfort with which you read. Sometimes you may have to comprise one for the other. But the designer's objective should be to achieve both in a design. The third topic layout enables the designer to apply the design principles and typography in practice. The topic layout explains the designer how to arrange the elements that he possesses. Within a specified area, the designer positions the elements in such a way that the design looks pleasant and presentable. In a way, he only has the white space which he must manage while position the elements like for example the heading, illustration, text and address.

The fourth topic inspires the designer to produce examples which should reflect what has been learnt in the earlier three topics. One of the best ways for a student is to gather newspapers, magazines, text books, novels, cartoons ,packaging covers etc. and relate an advertisement or display or title cover and identify what principle has been used in preparing a design. This collection will help the designer to put his best in his/her creativity.

The last topic Illustration is a decoration or visual explanation of a text, concept or process, designed for integration in published media, such as posters, flyers, magazines, books, teaching materials, animations, videogames and films. Working with illustrations and learning about different styles of text settings and lettering for layouts

Insert	Change whether to insert extra characters in the middle of the text
Delete	Delete the current character
Backspace	Deletes the previous character
Windows	Show you the window start menu
Menu	Show you the shortcut menu
F1	Get help from the computer
F2, F3F12 etc.,	Do special activities
Ctrl	Do special activities
Alt	Do special activities

#### Keywords used in the chapter

The Caps Lock, Num Lock, Scroll Lock, and Insert keys are called toggle keys: they create special effects, which end when you press the toggle key again.

**Missing keys:** If your keyboard has 101 keys instead of 104, your keyboard is missing the Menu key and the two Windows keys. Those 3 keys are unimportant, since most folks prefer to use a mouse instead of tapping those keys. If you wish, you can substitute other keys instead:

Instead of tapping the Menu key: tap the F10 key while holding down the Shift key.

Instead of tapping a Windows key: tap the Esc key while holding down the Ctrl key.

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If your keyboard has just 83 keys: Your keyboard is missing the Menu key and the two Windows keys, F11 and FI2 keys, The F1 through F1O keys are arranged in two columns down the keyboard's left edge instead of being spread out across the keyboard's top, second Ctrl key. the second Alt key, the second Enter key, and the second / key, the Pause key. (Instead, you must tap the Unlock key while holding down the Ctrl key.)

The Print Screen key is labeled "Prt Sc" and works just while holding down the Shift key. (If you don't hold down the Shift key, the Prt Sc key acts as the second \* key.).Your keyboard is missing the 4 arrow keys and these 6 editing keys: Insert, Delete, Home, End, Page Up, and Page Down. (To perform those functions. you must press number keys after you've turned off the Unlock.) 83-key keyboards work just with outdated computers. If you're using an 83-key keyboard, that's proof your computer is outdated! Buy a new computer system!

**Kinds of keyboards:** When buying a keyboard, you have many choices. You can buy an XT keyboard (83 keys), AT keyboard (101 keys). Augmented AT keyboard (101 keys plus an extra copy of the backslash key), or Windows.

#### **Short Answer Type Questions:**

- 1. What is Design? Explain about it as a Noun and as a Verb?
- 2. What are the three basic rules of Typography?
- 3. What is Legibility?
- 4. What is Readability?
- 5. Explain Pre-Layout Planning?
- 6. Write any Four Design and Layout considerations?
- 7. Bring out the difference between rough layout and comprehensive layout?
- 8. Explain Balance with suitable examples?
- 9. Explain Harmony with suitable examples?
- 10. Explain Contrast with suitable examples?
- 11. What is Illustration?

#### Long Answer Type Questions:

- 1. Explain the characteristics of a Design?
- 2. Explain the terms Legibility and Readability keeping Typography in mind?
- 3.Explain the historical progress of point system?
- 4. Explain the different kinds of layout and their method of preparation?
- 5. Prepare three designs each showing the principles of Balance, Harmony and Contrast?
- 6. Write short notes on a) Balance b) Optical Centre c) Rhythm d) Unity?
- 7. Explain about working with Illustration with example?

# UNIT 2

# **Desktop Publishing**

**Structure:** 

2.1 Concept of DTP System

**2.2 Input Devices** 

**2.3 Output Devices** 

2.4 Operating system

### Learning Objectives:

- To understand concept of DTP System
- To know different kinds of Input Devices
- To understand different kinds of Output Devices
- > To learn the function of different kinds of Printers
- To learn about Operating system

#### 2.1 Concept of DTP System

Desktop publishing means that the capture and editing of text, the capture of pictures (scanning) and their editing, and designing of graphic elements, as well as the completing of pages (layout) can be carried out at one computer station. Used together with an output unit (image setter) the PC can also carry out colour separations and screening of the finished pages, so that the whole page is exposed on a film (full-page film) or now a day's directly on a plate.

At the beginning of the '90s DTP took over the prepress almost overnight and has now almost completely replaced the specialized composition and image editing systems as well as photomechanical reproduction. Since around 1995 (even earlier for gravure printing), computer to plate technology (CTP) has played an increasingly important role. CTP means that the printing plate is imaged directly and the intermediate step of imaging a film is abandoned. In gravure, the cylinder is directly engraved using digital information. A further step in the production flow is therefore eliminated and ultimately all the prepress steps are carried out from a single computer workstation. There are already offset printing presses that use integrated exposure units to expose the plates in the press (direct imaging). Since no film is used in CT P, a previous proof must be made digitally, usually in the form of a proof print on a special dye sublimation, ink jet, or thermal printer.

Desktop Publishing (DTP) systems are used for editing the input text. This is the technology of electronic publishing where full-page documents are designed on a stand-alone work station, which may be a Personal Computer (PC) or other work station. Texts, graphics, and images are designed according to a pre-determined layout and integrated into the page. Cost effective DTP technology has now replaced the earlier photosetting technology. Typographically sophisticated DTP-typesetting/composition programs and a large choice of fonts enable photo setting quality to be achieved. Leading layout programs in the field of DTP are In Design (Adobe Systems) and QuarkXPress.

#### **2.2 Input Devices**

#### 2.2.1 Keyboard

The Keyboard is the most important device for communication between the operator and the computer. It is used to input the data into the computer. It resembles almost a standard QWERTY type keyboard with feather touch keys in addition to having special, function, numeric and cursor movement keys and displays & controls. It will have a temporary storage called "type ahead buffer" which is used to store the commands at the keyboard. The electrical circuits beneath the keys will translate the data into a computer understandable form. The Keyboard is basically a data entry device which senses the key depression, encodes the data being presented into a computer understandable language and sends the so encoded data to the Central Processing Unit/Prior to a decade keyboards were available only with 83 or 84 keys Later the "Enhanced 101-Key Keyboard" came into usage. Now-a-days keyboards are available with 121 keys, 136 keys and are termed as Multimedia Keyboards with advanced key functions so as to access the application programs with the single touch of a key.

The usual way to communicate with the computer is to type messages on the computer's keyboard. In 1981 IBM invented a keyboard containing 83 keys. That keyboard is called the XT keyboard because it was used on the original IBM PC and the IBM PC XT. In 1986, IBM began selling a fancier keyboard, containing 101 keys. It's called the AT keyboard, because it was used on the IBM PC AI. In 1995, Microsoft began selling an even fancier keyboard containing 104 keys. It's called the Windows keyboard, because it contains extra keys for Windows. Now "104 keys" has become the standard. Microsoft, IBM and competitors all sell keyboards containing 104 keys. The keyboard can print all the letters of alphabet (from A to Z), all the digits (from 0 to 9), and symbols:

**Details of the Keys:** A Keyboard will have the following keys.

Alphanumeric keys: These are the main keys used to input data in to the computer. These include Alphabet i.e. A to Z, numbers from 0 to 9 and some special symbols such as @, #, %,  $\land$  etc. similar to the keys available on the standard typewriter keyboard. These keys appear in the 2nd, 3rd, 4th and 5th rows of the keyboard.

**Function keys:** These keys appear on the first row of the keyboard and are programmed to perform special functions. They are; Fl. F2. F3. F4. F5, F6, F7, F8, F9, F10.The function of these keys differ from MS - DOS to other application program (ex: the key F1 in DOS mode recalls the previously entered line, one character at a time where as the same F1 key in a PageMaker program is used to access" help topics").

**Numeric keys and cursor keys:** These keys appear on the right side of the keyboard and are arranged like in a calculator and have two different functions according to the status of the Number Lock Key (Num Lock) When the number lock key is tapped the LED indicates (glowing a light) the num lock is on. In this status these keys serve to input numbers in to the computer and shift keys serve in reverse. When the num lock is off (indicator goes off) these keys serve as cursor movement control keys. To type a number easily, use the keys in the top row of the keyboard's main section. (For example, to type 4, press the key that has a 4 and a dollar sign.) To keep your life simple, do not press the number keys on the right side of the keyboard. Those keys produce numbers just if the Unlock key is pressed beforehand, by you or the computer. If the Unlock key
was pressed to produce numbers, and you want to stop making the right-hand keys produce numbers, tap the Unlock key again

Special Keys: These keys will have different functions basing upon the software being used.

**Esc (Escape) Key:** In most applications this key is used to cancel a command just you have entered. Income cases it invokes a menu of options.

**Tab Key:** Moves the cursor to the next tab (i.e. 8 spaces). In some software's this key is used for moving from one option to the other.

**Caps Lock Key**: When pressed converts the alphabet characters from lower case to the Uppercase. The Caps Lock Status indicator is lit during the Caps Lock Mode.

**Shift key:** These keys appear on either side of the fifth row. When pressed these keys shift the lower-case letters to upper case or vice versa depending upon the current mode. When the Caps Lock Key is on the operation will be reversed. If a key has two symbols on it, the key normally uses the bottom symbol. To type the top symbol instead, press the key while holding down the SHIFT key.

**Control Key**: It is operated in combination with other keys to enter special multi key commands or functions. for instance, press control key + s to save the document and pressing control  $+^{c}$  aborts the current task being executed and retunes you to the DOS mode.

Alt Key: Like control key It is also operated in combination with other keys to enter special multi key commands or functions, for instance press All key + s to delete a line containing the cursor and pressing control + alt + del automatically restarts the computer.

**Enter Key:** This key is used for two purposes. One is alerts the PC to execute the given instructions. The other is when using a word processor, it operates like a carriage return i.e. to begin the next line.

## **Correction Keys:**

Space Bar: Pressing space bar key inserts one blank space at a time.

Backspace Key: This erases any character or digit to the immediate left of the cursor.

**Insert Key**: This allows insertion of characters or digits to the left of the cursor. This is a "toggle key" i.e. pressing once brings to the insertion mode ON and pressing again will toggle it OFF.

**Scroll Lock Key:** Moves the text vertically on the screen line by line. The scroll lock key status indicator is lit during the scroll lock mode. It has no function under DOS mode.

**Delete Key:** This key deletes one character or digit that the cursor is presently on; when the text is highlighted as black it deletes the selected portion.

# **Cursor Movement Keys:**

Home Key: Brings the cursor to the beginning of the current line

End Key: Brings the cursor to the end of the current line

Page up Key: Moves the cursor to the previous page or screen

Page down Key: Moves the cursor to the next page or screen

**Special function keys:** 

**Print Screen Key:** This key is used to print whatever that is currently being displayed on the screen including graphic images or illustrations

**Pause Key:** When reading a large file through scrolling the lines faster it may cause inconvenience to read the text. In such a case press the pause key to stop scrolling for a while so as to enable the reading, to continue rolling the text press any other key.

Symbol	Official Name	Nicknames used by Computer Enthusiasts
	Period	Dot, decimal point, point, full stop
,	Comma	Cedilla
:	Colon	Dots, double stop
;	Semi Colon	Semi
!	Exclamation point	Bang, Shriek
?	Question Marks	Query, what, huh, wild char
	Quotation mark, quotes	Double quote, dieresis, rabbit ears
4	Apostrophe	Single quote, acute accent, prime
۲	Grave	Accent left single quote, open single quote,
		open quote, back quote
^	Circumflex	Caret, hats

~	Tilde	Squiggle, twiddle, not
=	Equals	Is, gets, takes
+	Plus	Add
-	Minus	Dash, hyphen
	Underline	Underscore, under
*	Asterisk	Star, splat, wildcard
&	Ampersand	Amper, amp, and, pretzel
@	At sign	At, whorl, strudel
\$	Dollar Sign	Dollar, buck, string
#	Number sign	Pound-sign, pound, tic-tac-toe
%	Percent sign	Percent, grapes
/	Slash	Forwarding slash, rising slash, slant, stroke
۸	Back Slash	Reverse slash, falling slash, back whack
	Vertical line	Vertical bar, bar, pile, enlarged colon
()	Parentheses	Open parentheses & close parentheses, left paren and right paren
{ }	Braces	Curly brackets, curly braces, squiggly braces, left tit & right tit
< >	Brackets	Angel brocket, less than & greater than, from & to, suck & blow
[]	Brackets	Open bracket & close bracket a square brackets.

The Shift key shows a fat arrow pointing up.

The Backspace key shows an arrow pointing left.

The Tab key shows arrows crashing into walls.

The Enter key shows arrow that's bent (going down and then left)

The Menu key shows a diagonal arrow pointing up at a menu

The Window key shows a flying window (having 4 curved window panes)

Backspace If 101 or 104 keys, the Backspace key is left of the Insert Key

If 83 keys, the Backspace key is left of the Num Lock key

Shift If 101 or 104 keys, the Shift keys are above the Ctrl keys

If just 83 keys, the Shift keys are above Alt and Caps Lock Enter If 101 or 104 keys, the Enter key is above the right-hand Shift Key

If just 83 keys,		the Enter key is above the Prt Sc key	
Windows If 104 keys,		the Windows keys are next to the Alt keys	
If 83 or 10	1 keys,	the Windows keys are missing	
Menu	If 104 keys,	the Menu key is next to the right-hand Ctrl key	
If 83 or 10	1 keys,	the Menu key is missing	

The keyboard contains special keys that help you do special activities (such as moving around the screen while you type):

Home	move back to the beginning
End	move ahead to the end
Page Up	move back to the previous page
Page Down	move ahead to the next page
Tab	hop to the next field or far to the right
Enter	finish a command or paragraph
Pause	pause until you press the Enter key
Print Screen	copy from the screen onto paper or onto the computer's clipboard
Shift	capitalize a letter
Caps Lock	change whether all letters are automatically capitalized

Num Lock	change whether keys on keyboard's right-side produce numbers	
Scroll Lock	change how text moves up & down	
Insert	change whether to insert extra characters in the middle of the text	
Delete	delete the current character	
Back space	deletes the previous character	
Esc	escape from a mistake	
Windows	show you the Windows-start menu	
Menu	show you a short-cut menu	
Fl	get help from the computer	
F2, F3F12 etc.	do special activities	
Ctrl	does special activities	
Alt	does special activities	

The Caps Lock, Num Lock, Scroll Lock, and Insert keys are called toggle keys: they create special effects, which end when you press the toggle key again.

Missing keys: If your keyboard has 101 keys instead of 104, your keyboard is missing the Menu key and the two Windows keys. Those 3 keys are unimportant, since most folks prefer to use a mouse instead of tapping those keys. If you wish, you can substitute other keys instead:

Instead of tapping the Menu key: tap the F 10 key while holding down the Shift key.

Instead of tapping a Windows key: tap the Esc key while holding down the Ctrl key.

If your keyboard has just 83 keys: Your keyboard is missing the Menu key and the two Windows keys, F11 and F 12 keys, The F1 through F 10 keys are arranged in two columns down the keyboard's left edge instead of being spread out across the keyboard's top, second Ctrl key, the second Alt key, the second Enter key, and the second / key, the Pause key. (Instead, you must tap the Unlock key while holding down the Ctrl key.)

The Print Screen key is labeled "Prt Sc" and works just while holding down the Shift key. (If you don't hold down the Shift key, the Prt Sc key acts as the second \* key.). Your keyboard is missing the 4 arrow keys and these 6 editing keys: Insert, Delete, Home, End, Page Up, and Page Down. (To perform

those functions, you must press number keys after you've turned off the Unlock.) 83-key keyboards work just with outdated computers. If you're using an 83- keyboard, that's proof your computer is outdated! Buy a new computer system

**Kinds of keyboard:** When buying a keyboard, you have many choices. You can buy an XT keyboard (83 keys), AT keyboard (101 keys), augmented AT keyboard (101 keys plus an extra copy of the backslash key), or Windows keyboard (101 keys plus 3 special keys that help run software called "Windows"). You can buy a standard size keyboard (with a ledge above the top row, for placing your pencil or notes), compact keyboard (which has no ledge and consumes less desk space), foldable keyboard (which folds in half, as if you are closing a book, so it consumes half as much desk space when not in use), or split keyboard (whose left third is separated from the rest, so you can have the comfort of typing while your forearms are parallel to each other). You can buy a tactile keyboard (which helps you neighbors by not making clicks), or spill-resistant keyboard (which is silent and also doesn't mind having coffee or soda spilled on it). The best split keyboard is the one made by Addison because it's tactile, requires little pressure.

#### 2.2.2 Mouse

The mouse is a hand held graphical input device. It is an alternative to keyboard entry. It is connected to computer by a cable. It can be moved in any direction on a flat surface or on a mouse pad. It contains two buttons i.e. left button and right button and in-between them a scrolling wheel. Underneath the mouse box there will be an electronic track ball which causes cursor/pointer to be positioned on the required item on the screen of the VDU. For most of the operations left mouse button will be operated. Right mouse button invokes a sub menu depending on the program that you are working with. Scrolling wheel is used to roll up/down the text on the screen. The cursor is an arrow mark (\) which moves on the screen in correspondence with the movement of the track ball on the pad. With the help of the mouse it is easy to choose specific option from the menu without using the keyboard. In technical term the mouse is called a"Puck"

**Use of buttons on the mouse:** As most of the software's are providing menu options for various commands, the mouse is proving to be useful and easy to choose a specific option from the menu. A mouse in general will have two buttons i.e. left button and right button.

Left Button: This button is used to select the required icon on the desktop and also to select the required menu options in all the Graphical User Interface applications. By pressing the left button and dragging the user can draw the required shapes; using drag and drop technique one can place the icon or a file from one place to another. It is also used to select the block of text in word processing packages so that the particular block can be cut or copied or pasted into other documents.

**Right Button:** It is generally used to display the properties of an icon or file or a folder in some GUI packages i.e. if the user wants to copy a file from one folder to another, by clicking the right button there appear the properties like Open, Explore, search ... etc. Select the explore option and then select the file to be copied using the left button. After highlighting the selected file right click the mouse button, where it displays the properties like Open, Cut, Copy, Paste ... etc. from these select the Copy option, and then the selected file pasted by selecting the paste option from three properties menu into the required file or folder. This button is also used to open a new file directly.

#### 2.2.3 Scanner

Since the entry of electronics into repro technology "expertless repro" has become in discussion point. Following the introduction of electronically controlled vertical repro cameras in the early 1970s, industry experts were already forecasting that from then on anyone could be trained to operate a camera in next to no time and would be able to produce the same results as highly trained experts. However, in the first phase of electronic reproduction these forecasts came to nothing, as the diversity of repro work still required too much know-how from the camera operator. This was all the more true for the powerful repro scanners which dominated color reproduction in the '70s and '80s working with these scanners required just as much experience as thorough training. This technical development did have a massive influence on the personnel structure, however. As scanners replaced cameras, the need for repro photographers diminished by the same amount; a new type of profession arose: scanner operators.. As electronic image processing gradually became established, lithography also took place at the computer, followed in the mid-' 80s by the integration of text and images.

Since then the market has come to be dominated by a totally different generation of scanners. Reproduction or "scanning-in" became just as popularized as typesetting had already become through desktop publishing. The possibility of using software to integrate the knowledge of whole generations of repro experts and lithographers into the hardware and software components of so called "one-button scanners" and their driver programs has been accompanied by a change not only in the qualifications required for the operators but also in the Work process in this area. There has also been a shift in the places where repro is carried out. In an era of rapid communication, scans or image data bases emanate from the repro department as well as the customer, agency, CD-ROM, or the internet. In this "mixed company" there is an even greater need for a functioning color management system. This means that all the scanners and image-processing stations should be calibrated and the profiles for subsequent processes should be known.

#### Scanner Types

- Drum scanners (horizontal. vertical, or inclined drum arrangement)
- Flat-bed scanners (desktop scanners, XY scanners)

#### **Functions:**

- Color scanners
- Slide and APS, scanners (Advanced Photo System)
- OCR scanner(OCR Optical Character Recognition)
- Rredigitizing scanners

#### **Designs:**

The various types of scanners are suited to a greater or lesser extent to a particular task. Which type of device is suitable for which task must be determined with the aid of an individual requirement profile:

- What type of original is to be processed?
- Are the originals flat or three-dimensional?
- Are the originals flexible or rigid?
- What is their format?
- By how much do the images need to be magnified?
- Are the originals mainly transparent or reflective/opaque (slides or photographic prints)?

- Are the originals predominantly black and white or coloured ?
- Do the originals have dearly defined lines and areas (line art originals)?
- Are they continuous-tone images, such as photographs, with gray tones or colour that merge smoothly into one another?
- Are the originals already printed?
- How are the recorded data going to be used and further processed?

#### 2.2.4 OCR (Optical Character Recognition)

Computer-aided system for optical-character recognition.

The text recognized can then be used in a text processing program. OCR technology is particularly useful for recording typewritten manuscripts, library stocks to be stored in databases or for reprints books that are only available in printed form. If the text is a bound book, there are machines available that automatically Turn the pages and handle the book while scanning as well as optical equipment that ensures correct reading near the seam — even for high page count. Manual correction marks and additions to the text can also be

recorded depending on the capability of the OCR software. A particularly widespread application of this technology is the automatic reading of bank documents filled-in manually, or for the distribution of mail.

The error rate of OCR equipment is less than 1%. This can increase dramatically if the text is smudged, the characters have not all been printed, or there are dirty mar s on the paper; so that input by hand via the keyboard may be more effective criteria for use are the method of recognition, the original texts that may be used, recognition speed, range and quality of the dictionary, output formats supported, and the price. Examples of software products are OmniPagePro (Caere Corp.) Optopus (Makrolog GmbH), and Adobe. Capture (Adobe Systems).

#### Input by OCR

Text supplied in printed or typewritten format is converted using OCR technology (Optical Character Recognition) into coded (therefore suitable for word processing) format. The paper document is first recorded as a bitmap image in an "imaging process" by means of optoelectronic scanning systems. In the subsequent OCR process the bitmap image of the printed text is converted to text code making it machine readable.

During the "imaging process" the document is scanned as a dot (pixel) matrix. The brightness of colour value of each dot is stored as a digital value. A binary scan is produced from black and white documents and requires one bit for each dot. Up to 32 bits per pixel are required for a four-colour scan. The scan resolution determines how accurately the scanned image matches the original .A resolution of 300dpi give sufficient OCR accuracy for more texts. (type size from about 4 mm character height, also depending on how sharp the reproduced characters are), Images and very small printed text in particular must be scanned at 600 dpi resolution. The image file format is typically TIFF (Tagged Image File Format). The OCR process (machine vision) includes the following five steps:

- i. Identification of text and image blocks. Images incorporated into the text are pass over;
- ii. Character recognition by analyzing the shape and comparing it with characteristic features for each individual character;
- iii. Identification of words using dictionary files;
- iv. Correction of unrecognized words or symbols; they are shown on the screen and either confirmed or corrected by the operator;
- v. Output formatting of the data in a chosen format such as ACII, WORD, RTF, or PDF and saving

them to a file.

The result of the process is that the text exists in coded form. Thus, it is just as suitable for word processing as text input via the keyboard.

## **2.3 Output Devices**

#### 2.3.1 Monitors

The computer's screen which is also called the visual display resembles a TV. The screen shows what you typed on the keyboard and also shows the computer's responses.

**Standard monitors**: A standard computer uses a kind of screen that's called a standard monitor. A standard monitor resembles a TV but produces a sharper picture and costs more. It has no antenna and no dial for selecting channels, the only channel you get is "computer". Like a TV, it contains a picture tube. The picture tube (in a TV or standard monitor) is called a cathode-ray tube (CRT).

**Colours versus monochrome**: When buying a TV, you ask for either "colour" or "black-and-white". Similarly, when buying a computer monitor, ask for either color or monochrome. A colour monitor displays all colours of the rainbow: a I monochrome monitor displays just black-and-light. Four kinds of monochrome monitors have been popular. But now monochrome monitors are all obsolete, standard computers use colour monitors.

#### How colours are produced?

On the monitor's screen, the picture shown is made of thousands of tiny dots. Each tiny dot is called a picture's element (pixel). In a colour monitor each pixel is made of three phosphors: one kind glows red if hit by an electron; another kind turns green, another kind turns blue. Inside the monitor, three guns can shoot beams of electrons at the phosphors. The red gun can shoot electrons at the red phosphors (to make them glow red), the green gun can shoot at the green phosphors (to make them glow green); the blue gun can shoot at the red phosphors (to make them glow blue).

- To make a pixel turn red, the computer tells the monitor's red gun to shoot at that pixel's red phosphor, so the pixel's phosphor glows red.
- To make a pixel turn green, the computer makes the monitor's green gun shoot at the pixel's green phosphor. Blue is similar.
- To make a pixel be very bright, the computer makes the monitor's three guns all tire at the same pixel. so the pixel's red, green, and blue phosphors all glow simultaneously. That makes the pixel be very bright —a hot white flash.
- To make a pixel be black, the computer makes none of the guns fire at the pixel.
- To make the pixel be cyan (greenish blue), the computer makes the green and blue guns fire simultaneously at the pixel. To make the pixel be magenta (purplish red), the computer makes the red and blue guns fire. To make the pixel be yellow, the computer makes the red and green guns fire (which produces a colour that's brighter and lighter than red or green alone).

That's how to produce 8 colors: red, green, blue, white, black, cyan, magenta. and yellow. Although a primitive monitor produces just those 8 colours, a modern monitor can produce extra colours by varying the strength of the electron beams. For example, instead of the red gun being either "on" or" off, it can be completely on, "partly on, or "off".

Here are the names for the different levels of monitors:

A primitive RGB monitor produces just 8 colors. Its cable to the computer includes a red-gun wire. a green-gun wire, and a blue-gun wire. Each wire's current has 2 choices (on or off), so the total number of colour choices is "2 times 2 times 2", which is 8.

A Color Graphics Adapter monitor (CGA monitor) can produce 16 colours. Its cable to the computer includes a red-gun wire, a green-gun wire, a blue-gun wire, and an intensity wire. Each wire's current has 2 choices (on or off), so the total number of choices is "2 times 2 times 2 times 2", which is 16.

An Enhanced Graphics Adapter monitor (EGA monitor) can produce 64 colours. Its cable to the computer 2 redgun wires (generating a total of 4 levels of red-gun intensity), 2 green-gun wires, and 2 blue-gun wires, so the total number of choices is "4 times 4 times 4", which is 64.

A Video Graphics Array monitor (VGA monitor) can produce over 16 million colours. Its cable to the computer includes 1 red-gun wire, 1 green-gun wire, and blue-gun wire, and each wire can handle 256 levels of intensity, so the total number of choices is "25times 256 times 256", which is 16,777,216. VGA has become the standard. Primitive RGB, CGA, and EGA monitors are obsolete. For a VGA monitor, the cable to the computer includes 1 red-gun wire, 1 green-gun wire, 1 blue-gun wire, and several other wires to help administer the signals. Altogether, the VGA cable contains 15 wires. CGA and EGA cables each contain just 9 wires. If you see a monitor whose cable contains just 9 wires, the monitor is either CGA or EGA. It's therefore obsolete.

**Size:** The typical VGA colour monitor's screen is 17-inch (17"). That means the distance from the picture tube's top left comer to the picture tube's bottom right comer is 17 inches, measured diagonally. Although the picture tube's diagonal size is 17-inch, you see just 16 inches, because 1 inch is hidden behind the plastic that makes up the monitor's case.

Most monitors are made by companies whose US headquarters are in California. Consumers complained to California's attorney general that such a monitor shouldn't be called "17-inch", since just 16 inches are viewable. California now requires all ads for "17-inch" monitors to include a comment, in parentheses. Saying that the viewable image size (vis) is just 16 inches, so the ad looks like this: 17" monitor (16" vis)

Instead of buying a 17-inch monitor, you can buy a bigger one (19-inch or 21-inch) or a smaller one (15-inch or 14-inch). In each case, the viewable image size is about an inch less than the size of the tube.

A 14" monitor (13" vis) is adequate for most people and most software, but few companies still offer 14" monitors. 15" shows the same info as 14" but slightly magnified, so you can read "the fine print" on the screen more easily. 17",19", and 21" monitors are much more pleasant; they're especially helpful if you're trying to create fine graphics (or ads) or many side-by-side columns (as in a newspaper, magazine, newsletter, textbook, or big table of numbers). The newest programs (and many parts of the Internet) expect you to have

at least a 17" monitor. Big monitors are also helpful if you have poor eyesight (or you're sharing the computer with somebody who has poor eyesight).

**Resolution:** Each position on the screen is called a pixel. The pixels are arrange in rows and columns, to form a grid. In a primitive VGA monitor, the screen- is wide enough to hold 640 columns of pixels, and the screen is tall enough to hold 480 rows of pixels, so altogether the number of pixels in the grid is "640 times 480". which is written "640X480", which is pronounced "640 by 480". That's called the screen's resolution. If you buy a big VGA monitor (such as 21-inch), the screen is big enough to hold lots of pixels. You can use such a screen in two ways: you can make the screen either show lots of tiny pixels or show a smaller number of fat pixels.

Here are how many pixels the typical screen can display:

Those resolutions have nicknames:

Resolution	Nickname	Alternative nicknames
640X480	minimal VGA	
800X600	Super VGA (SVGA	VGA Plus
1024X768	extended GA (XGA)	nice SVGA or Ultra VGA
	(UVGA)	
1280X1024	Super XGA (SXGA)	

**Refresh rate:** Here's how the red gun works:

It aims at the first pixel on the screen, decides how many electrons to fire at that pixel's red phosphor (depending on how red you want the pixel to be), and fires those electrons. Those electrons excite the first pixel's red phosphor and make the phosphor glow the appropriate amount. Then the red gun does the same thing for the screen's second pixel, then the third pixel, etc.

While the gun is dealing with later pixels, the gun is ignoring the first pixel's red phosphor, whose glow starts to fade. When the red gun finishes handling the last pixel, that gun hurries back to the first pixel and gives its red phosphor another shot of electrons, to refresh the phosphor's glow.

If the gun doesn't get back to the first pixel soon enough, that pixel's glow will have faded too much, and your eye will notice the fading and consider it an annoying flicker.

To avoid annoying flicker, the gun must get back to the phosphor fast, in less than an 85th of a second. That means it must refresh the phosphor at least 85 times per second. Instead of saying "the gun must refresh the phosphor at least 85 times per second," engineers say "the vertical refresh rate must be at least 85 hertz (85 Hz)."

If the vertical refresh rate is less than 85 hertz, your eye might detect some flicker, which will annoy you. The flicker will be noticeable mainly if you look at the screen out of the corner of your eye, since your eye's peripheral vision is most sensitive to flicker.

- 85 hertz is excellent, flicker-free.
- 75 hertz is rather good. It's acceptable to most folks, annoying to some.
- 60 hertz is rather bad. It's annoying to everybody but still usable.
- Below 60 hertz is terrible, unusable.

The typical cheap 17" monitor can show 1024X768 resolution well (at 85 hertz) but shows 1280X1024 resolution poorly (at 60 hertz). The ad for such a monitor typically begins by bragging that it can display 1280X1024 but then admits it handles that resolution poorly and should be used at just 1024X768; it says:1280X1024 @ 60Hz, 1024X768 @ 85Hz

**Trinitron:** In a traditional picture tube, each pixel is a trio of phosphor dots (red, green, and blue), arranged as three points of a triangle. That technique is called a dot-trio shadow mask.

Sony invented a more expensive kind of picture tube, called the Trinitron, using a technique called aperture grille: each pixel is a trio of vertical stripes (red, green, and blue), arranged side-by-side, like fence posts. That technique produces brighter colors and straighter vertical lines. But it makes diagonal lines look too bumpy; and if your eyesight is good, you'll notice an annoying grid of thin horizontal wires, which hold the vertical phosphors in place.

**Dot pitch:** The distance from a red phosphor to the closest nearest red phosphor is called the dot pitch. On a standard monitor, the dot pitch is .28 millimeters (.28mm). The smaller the dot pitch, the better. The best monitors have a dot pitch of .26, .25, .24, .23, .22/21. Terrible monitors have a dot pitch of .31, .39, .42, or .51. Their screens are too blurry to let you read small characters. On a Sony Trinitron monitor, the dot pitch is usually .25.

**Flat screen**: In a typical monitor, the picture tube's surface is curved. If you pay slightly extra, you can buy a flat-screen monitor instead, whose picture tube's surface is flat. It has two advantages:

- It displays horizontal and vertical lines more accurately (without curving).
- It reflects light from fewer angles (so you see fewer annoying reflections).

Where to put the monitor: According to researchers such as the government's National Institute of Occupational Safety and Health (NIOSH), here's where you should put the monitor so you'll be comfortable while you're working at the computer.... Put the monitor slightly lower than your eyes, so you look *down* at the monitor (instead of looking up, which would strain your neck). When you're looking at the center of the monitor's screen, you should be looking down slightly (at an angle that's 15 degrees below horizontal). Put the monitor a moderate distance from your face. NIOSH recommended that the distance from your eyes to the center of the monitor's screen be 17 inches; but that recommendation was made several years ago, when the typical monitor screen was just 12-inch. Now screens are bigger, so you need to sit farther from the screen to see the whole screen: a distance of 23 inches feels good to me.

Keep the room rather dark, to avoid having light reflected off the monitor's surface. Put the monitor perpendicular to any light source, so no light source shines directly onto the monitor's screen (which would create an annoying reflection) and no light source shines directly onto the monitor's back (since such a light source would also be shining into your eyes and create an annoying glare).

**Video Terminals:** A video-display terminal (VDT) is a monitor that has an attached keyboard and communicates with a big computer. If 200 people are using a maxi computer simultaneously, just one of them is sitting at the maxi computer's main console. The other 199 people typically sit at 199 video-display terminals (or 199 personal computers), which are in different rooms or even different cities.

**TV sets:** If your computer is old and primitive (such as an Apple 2 or Radio Shack Colour Computer or Commodore 64 or Commodore VIC or Atari 800), you can attach it to an ordinary TV set instead of to a monitor. Here's how to attach such a computer to a TV set:

Look at your TV's antenna. Wires run from the antenna to two screws, which are on the back of the TV. Loosen those two screws, to detach the antenna from the TV. Instead of attaching the antenna's wires to those two screws, attach the antenna's wires to a switch box (which is included in the price of such a computer), and then attach the switchbox to the two screws on the back of the TV, so the switchbox sits between the antenna and the TV. Finally, run an RCA cord from the switch box back to the computer.

The switch box has a switch on it, if you move the switch towards antenna, you have a normal TV, so you can watch Bill cosby. If you move the switch towards the computer's RCA cord, your TV is controlled by the computer can write messages on your TV screen.

By moving the switch, you can make your TV act either normal or computerized. Your family will argue about which way to move the switch.

That switch box is the same kind used by video-game machines. When you buy a TV computer, the salesperson gives you the switch box and RCA cord, free!

To use the computer, flip the computer's switch to channel 3 or 4, then turn your TV's dial to the same channel.

To get a sharp picture on your TV screen, avoid the channel used by your local TV station. For example, if you live in Boston, CBS hogs channel 4, so avoid channel 4; put your computer and TV on channel 3 instead.

Though most computers (such as Commodore and Radio Shack) use channels 3 and 4, some computers (such as Atari) use channels 2 and 3 instead. Some other computers use channels 10 and 33 and 34 instead.

If the image on your TV screen looks fuzzy, so that you can barely read the computer's writing adjust the TV's "fine tuning" knob.

Besides writing messages on your TV's screen, the computer can also draw its own pictures on the TV. If your TV has color, you'll see the pictures in colour.

When you watch Bill Cosby on TV, his face's size depends on the size of your TV's screen. If your TV's screen is tiny (less than 12 inches), his face looks small; if your TV's screen is 25 inches, his face looks bigger; and if you have a projection TV with a gigantic 60-inch screen, his face looks gigantic. The same is true for the messages & pictures that the computer sends to the TV: the bigger the TV's screen, the more magnified the computer's messages & pictures.

The computer can make the TV screen show words, numbers, and formulas. Those words, numbers, and formulas are made of characters: each character is a letter of the alphabet, a digit, or any other symbol you can type.

The ideal TV computer would make the TV display 25 lines of info, with each line of info containing 40 characters, so the total number of characters you see on the screen simultaneously is "25 times 40", which is 1000.

But most TV computers are less than perfect: they display slightly fewer than 25 lines of info and slightly fewer than 40 characters per line, so the total no of characters you see on the TV screen simultaneously is slightly less than 1000.

Liquid Crystals: If your computer is tiny, it comes with a tiny screen, called a liquid-crystal display (LCD). That's the kind of screen you see on digital watches, pocket calculators, pocket computers, subnotebook computers, notebook computers, and laptop computers.

Those computers use LCD screens instead of traditional picture tubes because LCD screens consume less electricity, weigh less, and are less bulky. Since an LCD screen uses little electricity, it can run on batteries. A traditional picture tube *cannot* run on batteries. I f your computer system runs on batteries, its screen is an LCD.

Desktop and tower computers use traditional picture tubes, for these reasons: Big picture tubes cost less than big LCD screens.

The image on the typical LCD screen has poor contrast and resolution and responds too slowly to computer commands.

**Kinds of LCD Screens:** A traditional LCD screen displays black characters on a white background. The screen consists of thousands of tiny crystals. Each crystal is normally white, but temporarily changes to black when an electrical charge passes through it. Newer LCD screens can display colors.

The main manufacturer of LCD screens is Sharp. Sharp's LCD screens are used in many brands of computers.

A notebook computer's price depends mainly on what kind of LCD screen it includes. Most folks buy color LCD screens, though blank-and-white monochrome LCD screens are cheaper. For color LCD screens, the old-fashioned kind is called passive; the next step up is dual-scan passive, which is brighter and works faster; the next step up is high-performance addressing (HPA); the most expensive is active-matrix, which is the brightest and works the fastest.

- Passive is also called super-twist nematic (STN).
- Dual-scan passive is called double-layer STN (DSTN).
- Active-matrix is called thin-film transistor (TFT).

Most folks buy colour screens that are active-matrix (which is the best type) or dual-scan passive (which costs \$100 less).

**LCD Monitors:** The typical LCD screen is built into a small computer (such as a notebook computer). A different way to get an LCD screen is to buy an LCD monitor, which acts as a monitor but includes an LCD screen instead of a CRT. You can attach the LCD monitor to a desktop or tower computer.

An LCD monitor is convenient because it consumes less desk space than a CRT. Unfortunately, an LCD monitor is very expensive (over \$1,000).

**LCD Plates:** An LCD plate (or LCD overhead-projection panel) is a special LCD screen that you put on an overhead projector, which projects the LCD's image onto the wall of your office or classroom or auditorium, so that the image becomes several feet across.

An LCD plate (or LCD overhead-projection panel) is a special LCD screen that you put on an overhead projector, which projects the LCD's image onto the wall of your office or classroom or auditorium, so that the image becomes several feet across.

The nicest low-cost LCD plate is the Sharp QA-75. It can display many shades of gray. It sells for about \$1500. It attaches to the IBM PC, and you can buy a cable to connect it to a Ma

#### 2.3.2 Printers

A computer usually displays its answers on a screen. If you want the computer to copy the answers onto paper, attach the computer to a printer, which is a device that prints on paper.

The typical printer looks like a typewriter but lacks a keyboard. To feed information to the printer, you type on the computer's keyboard. The computer transmits your request through a cable of wires running from the back of the computer to the back of the printer.

A computer's advertised price usually does not include a printer and cable. The cable costs about \$8; the typical printer costs several hundred dollars.

Printers are more annoying than screens. Printers are noisier, slower, cost more, consume more electricity, need repairs more often, and require you to buy paper and ink. But you'll want a printer anyway, to copy the computer's answers onto paper that you can give your computer less friends. Another reason to get a printer is that a sheet of paper is bigger than a screen and lets you see more information at once.

#### Three kinds of printers are popular:

#### Laser Printers

A laser printer looks like a photocopier. Like a photocopier, it contains a rotating drum and inky toner. It prints even more beautifully than the other two kinds of printers. Like a photocopier it's expensive and typically cost \$400.

#### **Inkjet Printer**

An inkjet printer looks like a dot-matrix printer; but instead of containing a ribbon. it contains tiny hoses that squirt ink at the paper .It prints more beautifully than a dot-matrix printer and costs more. It typically costs about \$200. How does the ink get out of the nozzle and onto the paper?

In inkjet printers by HP and Canon, a bubble of ink in the nozzle gets heated and becomes hot enough to burst and splash onto the paper. Epson's inkjet printers use a different technique, in which the nozzle suddenly constricts and forces the ink out.

When using an inkjet printer, try different brands of paper.

Some brands of paper absorb ink better. If you choose the wrong brand, the ink will wick (spread out erratically through the strands of the paper's fiber). Start by trying cheap copier paper, then explore alternatives. The paper brand you buy makes a much bigger difference with inkjet printers than with dot-matrix or laser printers. Canon's printers are the best at tolerating paper differences, but Canon's ink is water-based and smears slightly if the paper or envelope gets wet (from rain or a sweaty thumb).

#### **Dot matrix Printer**

A dot-matrix printer looks like a typewriter but has no keyboard. Like a typewriter, it smashes an inked ribbon against the paper. Like a typewriter, it's cheap: it typically costs about \$150. A dot-matrix printer resembles a daisywheel printer; but instead of containing a daisy wheel, it contains a few guns, as if it were a super-cowboy whose belt contains several holsters. Each gun shoots a pin *at* the inked ribbon. When the pin's tip hits the ribbon, and smashes the ribbon against the paper, a dot of ink appears on the paper. Then the pin retracts back into the gun that fired it. Since each gun has its own pin, the number of guns is the same as the number of pins.

#### 9-pin Printers

If the printer is of average quality, it has 9 guns — and therefore 9 pins. It's called a 9-pin printer. The 9 guns are stacked on top of each other, in a column that's called the print head. If all the guns fire simultaneously, the pins smash against the ribbon simultaneously, so the paper shows 9 dots in a vertical column. The dots are very close to each other, so that the column of dots looks like a single vertical line. If just some of the 9 pins press against the ribbon, you get fewer than 9 dots, so you see just part of a vertical line.

To print a character, the print head's 9 guns print part of a vertical line; then the print head moves to the right and prints part of another vertical line, then moves to the right again and prints part of another vertical line, etc. Each character is made of parts of vertical lines — and each part is made of dots. The pattern of dots that makes up a character is called the dot matrix. That's why such a printers called a 9-pin dot-matrix printer.

Inside the printer is a ROM chip that holds the definition of each character. For example, the ROM's definition of "M" says which pins to fire to produce the letter "M". To use the ROM chip, the printer contains its own CPU chip and its own RAM.

When microcomputers first became popular, most dot-matrix printers for them were built by a New Hampshire company, Centronics. In 1980, Japanese companies took over the marketplace. Centronics went bankrupt. The two Japanese companies that dominate the industry now are Epson and Panasonic.

Epson became popular because it was the first company to develop a disposable print head — so that when the print head wears out, you can throw it away and pop in a new one yourself, without needing a repairman. Also, Epson was the first company to develop a low-cost dot-matrix impact printer whose dots look "clean and crisp" instead of looking like "fuzzy blobs". Epson was the main mason why Centronics went bankrupt.

Epson is part of a Japanese conglomerate called the Seiko Group, which became famous by timing the athletes in the 1964 Tokyo Olympics. To time them accurately, the Seiko Group invented a quartz clock

attached to an electronic printer. Later. the quartz clock was miniaturized and marketed to consumers as the "Seiko watch", which became the best-selling watch in the whole world. The electronic printer, or "ER", led to a better printer, called the "son of E.R", or "EP's son". That's how the Epson division was founded and got its name! Epson's first 9-pin printer was the MX-80. Then came an improvement, called the FX-80. Those printers are obsolete; they've been replaced by Epson's newest 9-pin wonders, the FX-880 (which costs \$250) and the FX-1180 (which can handle extra-wide paper and costs \$380). Epson's cheapest and slowest 9-pin printer is the LX-300+ (\$190). You can get those prices from discount dealers (such as Tri State). Panasonic For a 9-pin printer, I recommend buying the Panasonic 1150 instead, because it prints more beautifully and costs just \$149 from discount dealers such as Harmony. Too bad it can't handle extra-wide paper! Other Japanese besides Epson and Panasonic, four other Japanese companies are also popular, NEC, Oki, Citizen, and Star. Compatibility printers from all six of those Japanese companies are intended mainly for the IBM PC, though they work with Apple 2 and Commodore computers also. Apple the most popular printers for the MAC were the Image Writer and the Image Writer 2. They were designed by Apple to print exact copies of the Mac's screen. They even print copies of the screen's wild fonts and graphics. Apple stopped selling them.

#### 7-pin printers

Although the average dot-matrix printer uses 9 pins, some older printers use just 7 pins instead of 9. Unfortunately, 7-pin printers can't print letters that dip below the line (g, j, p, q, and y) and can't underline. Some 7-pin printers print just capitals; other 7-pin printers "cheat" by raising the letters g, j, p, q. and y slightly.

#### 24 - Pin printers

Although 9 pins are enough to print English, they're not enough to print advanced Japanese, which requires 24 pins instead. Manufacturers the first company to popularize 24-pin printers was Toshiba. Its printers printed Japanese —and English — beautifully. 24-pin Toshiba printers became popular in America, because they print English characters more beautifully than 9-pin printers. Epson and all the other Japanese printer companies have copied Toshiba. Here are the cheapest wonderful 24-pin printers:

- The Epson Action Printer 3250 has a black ribbon and costs \$150.
- The Panasonic 2130 has a black ribbon and costs \$169 (\$199 minus \$30 rebate).
- The Panasonic 2135 has a multicolor ribbon and costs \$239.
- The Epson LQ-570e is sturdier, easier to operate, has a black ribbon, costs \$240.

You can get those prices from Tri State and Harmony. While supplies last, Tri State has an even better deal: get a refurbished Epson LQ-570+ for just \$160! Phone Tri State at 800-433-5199 or 212-633-2530.

The cheapest 24-pin printer that handles wide paper is the Epson LQ-2080 (\$400).24-pin printers print more beautifully than 9-pin printers but print slower, are less rugged, and don't bang hard enough to print multiple copies on thick multi-part forms.

Pin arrangement in a typical 24 pin printer (such as Epson action printer 3250) the even number pins are slightly to the right of the odd-numbered pins, so you see two columns of pins. After firing the evennumbered pins the print head moves to the right and fires the odd-numbered pins whose dots on paper overlap the dots from the even-numbered pins. The overlap insures that the vertical column of up to 24 dots has no unwanted gaps.

In fancier 24-pin printers (such as the Panasonic 2130 & 2135), the 24 pins are arranged as a diamond instead of two columns, so that the sound of firing pins is staggered: when you print a vertical line you hear a quiet hum instead of two bangs.

**Beyond 24 pins:** The fastest dot-matrix printers use multiple print heads, so that they can print several characters simultaneously.

**Daisy-wheel printers:** Although the most popular kinds of printers are dot-matrix, inkjet, and laser, some folks still use an older kind of printer, called a daisy-wheel printer. It's cute! Here's how it works.

Like a typewriter and a dot-matrix printer, a daisy-wheel printer smashes an inked ribbon against paper. To do that, the daisy-wheel printer contains a device called a daisy wheel, which is an artificial daisy flower made of plastic or metal. On each of the daisy's petals is embossed a character: a letter, a digit, or a symbol. For example, one petal has the letter A embossed on it; another petal has B; another petal has C; etc. Notice that each character is embossed. (The word "embossed" is like "engraved", but an "embossed" character is raised *up* from the surface instead of etched into the surface.)To print the letter C, the printer spins the daisy wheel until the C petal is in front of the inked ribbon. Then a hammer bangs the C petal against the ribbon, which in turn hits the paper, so that an inked C appears on the paper.

# 2.4 Operating System

#### 2.4.1 MS DOS

MS-DOS (short for Microsoft Disk Operating System) is an operating system for x86-based personal computers. It was the most commonly used member of the DOS family of operating systems, and was the main operating system for IBM PC compatible personal computers during the 1980s to the mid-1990s, until it was gradually superseded by operating system offering a graphical user interface (GUI), in particular by various generations of the Microsoft Windows operating system.

MS-DOS grew from a 1981 request by IBM for an operating system for its IBM PC range of personal computers. Microsoft quickly bought the rights to QDOS (Quick and Dirty Operating System), also known as 86- DOS, [2] from Seattle Computer Products, and began work on modifying it to meet IBM'S specification. The first edition, MS-DOS 1.0, wasnlaunchednin 1982.[3] The version shipped with IBM'S PCs was called PC DOS. Although MS-DOS and PC DOS were initially developed in parallel by Microsoft and IBM, the products eventually went their separate ways.

During its life, several completing products were released for the x86 platform,[4] and MS-DOS itself would go through eight versions, until development ceased in 2000. Ultimately it was the key product in Microsoft's growth from a programming languages company to a diverse software development firm, providing the company with essential revenue and marketing resources. It was also the underlying basic operating system on which early versions of windows ran as a GUI.

MS-DOS (Microsoft Disk Operating System) is *a* single-user, single tasking computer operating system that uses a command line interface, In spite of its very small size and relative simplicity, it is one of the most successful operating systems that has been developed to date.

MS-DOS has a relatively small number of commands, and an even small, number of commonly used ones. Moreover, these commands are generally inflexible because, in contrast to Linux and other Unix-like operating system, they are designed to accommodate few options or arguments (i.e., values that can be passed to the commands).

Some of the most common commands are as follows (corresponding commands on Unixlike operating systems are shown in parenthesis):

CD - changes the current directory (cd)

COPY - copies a file (cp)

DEL - deletes a file (rrn)

DIR - lists directory contents (ls)

EDIT - starts an editor to create or edit plain text files (vi, vim, ed, joe)

FORMAT- formats a disk to accept DOS files (mforrnat)

HELP-displays information about a command (man, info)

MKDIR - creates a new directory (mkdir)

RD - removes a directory (rmdir)

REN - renames a file (mv)

TYPE - displays contents of a file on the screen (more, cat)

#### 2.4.2 Windows XP

Windows xp is an operating system produced by Microsoft for use on personal computers, Including home and business desktops laptops and media centers. First released to computer manufactures on August 24,2001, it is the second most popular version of windows, based on installed user base. The name "XP" is short for "eXPerience ."

Windows XP, the successor to Windows 2000 and Windows Me, was the first consumer-oriented operating system produced by Microsoft to be built on the Windows NT kernel. Windows XP was released worldwide for retail sale on October 25, 2001, and over 400 million copies were in use in January 2006. It was succeeded by Windows Vista in January 2007. Direct OEM and retail sales of Windows XP ceased on June 30, 2008. Microsoft continued to sell Windows XP through their System Builders (smaller OEMs who sell assembled computers) program until January 31, 2009.

The NT-based versions of Windows, which are programmed MC, C++, and assembly, are known for their improved stability and efficiency over the 9xversions of Microsoft Windows. Windows XP presented a significantly redesigned graphical user interface, a change Microsoft promoted as more user-friendly than previous versions of Windows. Anew software management facility called Side-by-Side Assembly was introduced to ameliorate the "DLL hell" that plagues 9x versions of Windows. It is also the first version of Windows to use product activation to combat illegal copying.

During development, the project was code named "Whistler", after Whistler, British Columbia, as many Microsoft employees skied at the Whistler Black combski resort.

According to web analytics data generated by W3Schools, from September 2003 to July 2011, Windows XP was the most widely used operating system for accessing the Internet. As of February 2012, Windows XP market share is at 30% after having peaked at 76.1% in January 2007.

Windows XP is nothing but an entire line of operating system which has been initiated and developed by Microsoft can be used on several computer systems that are general-purpose, including desktops at home and business, media centers and notebook computers. Windows XP was codenamed "Whistler", after Whistler British Columbia, and the letters XP stand for experience. The two words were combined together to form "Windows XP". Windows XP was released in the year 2001 on October 25 and by January 2006 above 350 million copies were being used all over.

People used windows 2000 and windows ME before Microsoft develop windows XP. Windows XP is the first operating system which is consumer based produced by Microsoft, which is to be built on the Windows NT kernel and architecture. Microsoft windows xp is the most commonly used and supporting operating systems today. Windows vista which is now a successor of windows 'XP' was released worldwide in Jan 30 2007.

The minimum requirements specified by Microsoft for Windows **XP** are 233MHz processor, 1.5GB of available hard drive space, an SVGA-capable video card and 64MB of RAM. Although it is strongly recommended by UITS that any system running XP should have a CPU which is faster than 400MHz and at least 256MB of RAM.

Microsoft created Windows XP in order to update the user interface, add' new features, unify the code base between the separate families of Windows, which were never associated with Windows before. Windows XP is famous all over for its better stability and higher efficiency when compared to the 9x versions of Microsoft Windows. The key features of Windows XP include:

**Remote Desktop:** It allows you to remotely log into another computer running XP and access its applications, files, printers and devices.

**Remote Assistance**: Here, you can invite someone to connect to your computer and give help over the network or even control your computer remotely.

**Fast user switching:** It allows a user to save the current state and open applications of their desktop and allow another user to log on without losing that information.

**Clear type Font rendering mechanism:** It improves text readability on the LCD- Liquid Crystal Display and similar type of monitors.

**Task grouping**: Windows XP features a new task-based graphical user interface, including the framework for developing the themes for the desktop environment

Languages: Windows XP is available in many languages. In addition. add-ons translating the user interface are also available for certain languages

#### 2.4.3 Text Manipulation

Simple text data files contain text without formatting. A text data file can contain all the characters of a particular character set (ANSI, ASCII), including space signs and paragraph markers. Simple text data files can be imported into all programs that can process text — regardless of the computer platform — and are, therefore, the preferred text exchange format between application users (e. g., Microsoft Office, Star Office from Star Division) and platforms (e. g., Apple Macintosh, PC, Unix workstation). Umlauts and special characters, however, are not correctly reproduced when exchanging text between different platforms/

That becomes clear when an e-mail that has been written, for example, on a Mac is opened on a PC. There is room for further development and improvement in this area.

"RTF (Rich Text Format) contains instructions for text formatting, such as font, font size, format of paragraphs, and so on. These instructions can be read and interpreted by RTF-compatible word processors, graphics, and layout programs. word processing programs (e.g., Microsoft Word, Star Office) use non-standardized data file formats that, in addition to formatting, can also contain information on document structure, as well as graphic elements and embedded images. These formats cannot normally be imported from other programs, or only with loss of information, and are, therefore, not suitable as exchange formats.

The method of working has not been changed by the introduction of digital production, only the place of execution has changed in most cases: that is from the departments of typesetting and reproduction to the corresponding departments at the customer's or at the agency.

The text data are primarily prepared in "Word" format, which has virtually become the word processing standard, since it is most widely used and offers many professional tools. The text data are very rarely edited directly in Word; instead they are positioned and typographically edited in a layout program (e.g., QuarkXPress, InDesign, or PageMaker).

#### Summary:

The advantages of DTP System over conventional methods of publishing are essence of this chapter. It clearly spells out different components of DTP System. Different kinds of Input devices which play a major role in entering the data of all kinds like text, illustration, graphics etc, are described in detail. Followed by this the output devices are also explained in depth and the role they play in seeing the output in hardcopy form. Different types of printers produce hardcopy and yield WYSIWYG Copies. Detailed study of role of printers forms a good part of this chapter. Mention is also made of operating system.

#### Short answer type Questions:

- 1. What is DTP System?
- 2. What is the function of keyboard? Name different types of keys?
- 3. What is OCR
- 4. How ate colours produced in monitor?
- 5. Write types of printers ?
- 6. What is a dot matrix printer?
- 7. What is Ms-Dos?
- 8. What is Windows XP?
- 9. What is text manipulation?
- 10. Spell out WYSIWYG?

#### Long Answer Type Questions:

- 1. Give a detailed comparison between conventional publishing and desktop publishing?
- 2. Explain about different kinds of Input Devices?
  - 3. Give a description of various kinds of Output Devices?
  - 4. Explain OCR and state its advantages?
  - 5. Explain how colours are produced on monitors?
  - 6. Write short note on 1) LCD Screen 2) LCD Plates?
  - 7. Compare the working of an Inkjet Printer and Dot-matrix Printer?
  - 8. Bring out the salient features of Ms-Dos and Windows XP?

# UNIT 3

# **Colour Separation**

# Structure

- **3.1 Basic Colour Theory**
- 3.2 Light and Colour
- **3.3 Additive Colours Synthesis**
- 3.4 Subtractive Colours Synthesis
- **3.5 Basic Separation Theory**
- **3.6 Colour Management**

# **Learning Objective**

$\rightarrow$	To understand colour theory
$\triangleright$	To know the relationship between light and colour
$\triangleright$	To compare additive colours and subtractive colours
$\triangleright$	To study the colour family
$\triangleright$	To define colour separation
$\triangleright$	To understand colour management
$\blacktriangleright$	To know the choice and effective use of colours

#### **3.1 Basic Colour Theory:**

#### **Colour Theory**

What we see in the "real world" is in colour. We are sensitive to all the hues (Colours) in the colour spectrum. The source of all colour is light. Colour is property of light waves reaching our eyes not of the object seen. The Object has the property of absorbing some wave length while allowing others to reflect.

Colour are manufactured in the mind's eye. It is the eye and brain of the observer that interpret the meaning of these sensory messages by "Cones" in the Retina.

Colour is the name given to the reflection of wavelength from surface. Colour is a sensation produced upon the eye-retina which covered with a number of microscopic light sensitive nerve cells of "rods" and "cones".

When we look at a red rose, we see it only because light reflects from it into our eyes. Light rays strike the rod object which absorbs the other colours except red. Red is being reflected to produce red effect.

The red rose reflects only red rays: in like manner, the colour of everything depends upon which colour rays are absorbed and which are reflected.

#### **3.2 Light and Colour:**

**Colour**: Colour is a phenomenon of perception not an objective component of characteristic of a substance. Colour is an aspect of vision; it is a psychophysical response consisting of the physical reaction of the eye and the automatic interpretive response of the brain to wavelength characteristics of light above a certain brightness level (at lower levels and eye senses brightness differences but it is unable to make colour discriminations).

That light is the source of colour was first demonstrated in 1666 by Isaac Newton, which passed a beam of sunlight through a glass prism, producing the rainbow of hues of the visible spectrum. This phenomenon is often been observed before, but it always been related to latent colour that was said to exist in the glass of the prism. Newton, however took this simple experiment a step further. He passed his miniature rainbow through a second prism that reconstituted the original white beam of light. His conclusion was revolutionary. Colour is in the light, not in the glass and the light people see is mixture of all colours of the visible spectrum.

The reason rainbow appears coloured is because the light is broken down into its constituent parts by passing through the water droplets in the air. The perception of colour in a rainbow is proportional to the viewer's perspective, you move, it moves.

The theory of colour has gone through some changes overtime and it is now an accepted fact that the colour is truly in the eye of the beholder. "This is due to the fact that, as sensed by man, colour is a sensation and not a substance".

Different people can also see colour differently. We all agree the sky is blue, but a piece of reflective art may look slightly blue to one person while another see it as slightly cyan. If you don't know the difference between the look of the blue as opposed to cyan then communicating your preferences to a technician can be problematic. Subtle colour variance are best seen under correct viewing condition(not by a window, etc) and can take some time to learn to even see them. Then when you both see and separate these differences, then comes the task of communicating your choice for correction to a technician in the right terms.

#### **3.3 Additive Colours or Synthesis:**

Additive colour synthesis is a method of creating colour by mixing various proportions of two or three different stimulus colours of light. These primary colours are red, green and blue; however, they may be any wavelengths to stimulate different receptors on the retina of the eye.

The distinguishing features of additive colour synthesis are that it deals with the colour effects of light rather than with pigments, dyes, or filters, and that the stimuli come from separate monochromatic sources. The most common example of additive colour synthesis is the colour television screen (or RGB Monitor), which is a mosaic of red, green and blue phosphor dots; at normal viewing distances, the eye does not distinguish the dots, but balances or add the stimulus effects to obtain a composite colour effect.

This is an enlarge example of additive colour synthesis from a RGB type source.

The principle of additive colour synthesis are as follows (numerals indicate relative proportions)

(a) Equal stimulus proportions of two primary colours create a secondary colour

1 Red + 1 Blue = Magenta

1 Blue + 1 Green = Cyan

1 Green + 1 Red = Yellow

- (b) Equal stimulus proportions of all three primaries create White: 1 Red + 1 Green + 1 Blue = White
- (c) Unequal proportions of two or three primaries create other colours:

2 Blue + 1 Green = Orange

2 Green + 1 Red = Lime

1 Blue + 1 Green + 4 Red = Brown

All the colour sensation can be produced this way, including these red-blue mixes (purples and magentas) not found at any wavelength in the spectrum. Below fig : 3.1 shows Additive Colours Synthesis





In Photography, the principles of additive colour synthesis underlie making separation negatives for photo mechanical reproduction of colour images, and dye transfer and similar printing processes. It was also the principle behind the auto chrome film processes and similar screen processes. In the darkroom additive colour printing uses red, green and blue exposures to obtain prints from colour negatives and transparencies. The grain maker fitter relies on the principle of additive colour printing.

#### **3.4 Subtractive Colour Synthesis:**

Uses paint, dyes, inks and natural colourants to create colour by absorbing some wavelengths of light and reflecting or transmitting others. This subtractive action is the basic of photographic filters, almost all film and colour papers and photo mechanical reproduction in colour.

White light is composed of all visible wavelengths, which can be divided into three primary colour bands red, green and blue. A colourant that absorbs one wavelength band has the combined colour

of the other two; it is the complement of the colour that subtracts from white light. The complementary colours are the control colours of subtractive colour synthesis; thus; thus, the dyes in colour filters and emulsions, and the inks (process colours) used in photo mechanical reproduction is cyan, magenta and yellow. A single complementary produces its own colours. Two complementariness in equal strength

produces a primary colour because each absorbs a primary - e.g., magenta and yellow absorb green and blue, respectively, leaving red to seen. Combinations of unequal subtractive strengths produce intermediate colour from the white light. A combination of all three complementariness produces black (full strengths) or gray (lesser equal strengths) because all colours are subtracted. In colour filtration this produces neutral density. Below fig : 3.2 shows Subtractive Colour Synthesis





Primary-colour lights can be additively mixed to produce colours, but primary-colour dyes, inks, or filters do not permit selective colour control by subtractive action because each absorbs the other two primaries equally. The complementary colours permit subtractive control of each of the three primaries individually, Lime Additive Synthesis, this corresponds with the three colour theory of vision.

#### **Colour Family:**

**The Primary colours:** There are three colours in light and three in pigment called primary. Primary colours are basic colours, they are pure, unmixed, uncompounded and unmade from a single pigment. The familiar pigment primaries are red, yellow and blue. The light primaries are green, red and orange and all

colours are derived from the mixtures of pigment primaries and all colours from mixtures of light primaries.

From the mixture of pigment primaries, we can further, obtain secondary colours are tertiary colours.

**The Secondary Colours**: These are secondary family in colour family. Secondary colours are obtained by mixing two primary colours. For example, we can produce green by mixing blue and yellow proportionately equally, Orange is produced by mixing red and yellow equally and violet is produced by mixing red and blue equally.

**The Tertiary Colours**: Third in the colour family and are obtained by mixing equally a pair of secondary colours orange, green and violet. Tertiary colours are Olive, Russet and Citron. Colours can be divided into two groups according to psychological suggestions as warm and cool.

Warm colours are red and yellow. They are stimulating and advance to the foreground warm colours and have stronger radiation, more temperature than cool colours, cool colours are blue, or predominantly blue. They are relaxing and recede on the page. Cool colours have weaker radiation and low temperature. Green and reds purple lie between the warms and cools and are thus relatively neutral to apply colour effectively. Typographer artist and printer need a basic understanding of the various dimensions of colour-hue, value and chromium.

**Hue:** Hue is a synonym for colour. We distinguish one colour from another because of the quality of the hue. For identification purposes hues are classified by arrangement.

**Value:** Value differs to the lightness or darkness of darkness of a hue. A colour can be lightened by mixing with a lightness or darkness of a hue. A colour can be lightened by mixing with a lighter hue of the same colour or by the addition of white. Lightening a colour ink with white ink or by screening the printing plate with a tint block.

**Shade:** A darker value is called a shade and it is produced by adding a darker hue of the same colour or black. A printer can reduce the value by mixing the colour ink with black or by over printing the colour ink with a screened black.

**Chroma:** Chroma refers to the purity or strength of the colour. Grey is a neutral colour without hue and can be developed by equal mixture of black and white.

**Complementary Colours**: Complementary colours are opposite to each other on the colour wheel. Two colours are called complementary when one consists of what the other lacks to contain the primary colours. Red is the complementary, finishing colour of green. When red is mixed with green we can make brown black final colour.

**Complementary** (**Two Colours**): Quoting from chevreul "The contrast of most opposite colours is most agreeable ". In the colour wheel the opposite colours are complementariness. Observe the colour wheel.

The straight line indicates the complementary colours. When we turn the straight line we get all the complementariness. They are

Red and Green Red – Orange and Blue – Green Orange and blue Yellow – Orange and blue – Violet Yellow – Green and Red – Violet

**Analogous:** Closely related or neighboring colours of the colour wheel are called analogous colours. Related colours are either warm or cool. Analogous colours are green. Blue-green and blue or red-orange, orange and yellow-orange. Analogous colours are less exciting the complementariness since contrast is missing.

**Split complementaries (Three colour):** A colour is used in contrast with the colour adjoining its complementary on either side of the colour wheel. For example, the split complements of blue are yellow-orange and red-orange

More contrast can be affected with the split complementaries. Here a key colour is combined with the two hues that lie next to its opposite.

Inscribing a isosceles triangle in the colour wheel as seen in the opposite illustration and rotating in the axes, the vertices of isosceles triangle give the following complements.

Yellow with Blue - Violet and Red - Violet

Yellow - Green with Violet and Red

Green with Red – Violet and Red – Orange

Blue - Green with Red and Orange

Blue with Red – Orange and Yellow Orange

Violet with Yellow - Orange and Yellow - Green

Red - Violet with Yellow and Green

Red with Yellow - Green and Blue - Green

Red – Orange with Green and Blue

Orange with Blue - Green and Blue - Violet

Yellow - Orange with Blue and Violet

**Double split complementaries (Four Colour):** Two adjacent colour of each complementary colour form a double split complementary. the Chords (straight lines) connecting them becomes a rectangle. This rectangle can be rotated and the following double split complementaries are derived.

Yellow – Green; Yellow – Orange, Red – Violet and Blue – Violet Green, Violet, Red and Yellow Blue – Green, Red – Violet, Red-Orange, and Yellow – Green Blue, Green, Orange and Red Blue – Violet, Red – Orange, Yellow – Orange and Blue – Green Yellow, Orange, Violet and Blue

#### **3.5 Basic Separation Theory:**

**Definition:** Colour separation is the process by which original artwork is separated into individual colour components for printing. The components are Cyan, magenta, Yellow and Black known as CMYK. By combining these colours a wide spectrum of colours can be produced on the printed page. In this four colour printing process each colour is applied to a printing plate. When the colours are combined on the paper (they are printed as small dots), the human eye combines the colours to see the final image. Colour separation involves splitting a colour copy into the primary colours like Cyan, magenta, Yellow and Black (previously with the aid of colour separation filters) but today also possible on computer taking the digital description of the original colorimetric data as a basis.

The act of decomposing a colour graphic or photo into single-colour layers. For example, to print full-colour photos with an offset printing press, one must first separate the photo into the four-basic ink colours cyan, magenta, yellow and black (CMYK). Each single colour layer is then printed separately, one on top of the other, to give the impression of infinite colours.

This type of colour separation, mixing three of four colours to produce an infinite variety of colours is called process colour separation. Another type of colour separation is called spot colour separation and is used to separate colour that are not to be mixed. In this case each spot colour is represented by its own ink which is specially mixed. Spot colours are effective for highlighting the text but they cannot be used to reproduce full-colour images.

Traditionally, process colour separation has been performed photographically with different coloured filters. However modern desktop publishing systems are now capable of producing colour separations for graphics stored electronically. This capability is essential if you want to create full-coloured documents on your computer and then print them using an offset printer. You don't need to

perform colour separation if you are printing directly to a colour printer because in this case the printer itself performs a colour separation internally.

# **3.6 Colour Management:**

Many practical pointers help the designer plan printed pieces with colour, the following points may cover many considerations applicable to single and multi-colour printing.

- 1. When using more than one colour, reserve the darkest for the basic message, using the additional colours or colours for emphasis or for setting mood.
- 2. Colour for type should be light to insure easy legibility. In general, the smaller the type the lighter the colour should be. Darker colour may be screened to appear light or dull.
- 3. If the type size is large, colour has a better chance of supporting legibility. It is the safest to use colour on type of emphasize a few words in a headline.
- 4. If four colour and black and white halftone appear in the same sheet and black and white half tones are large and dark, they may need heavy inking for satisfactory printing.
- 5. Care is required when a type running in colour. Let us assume a red or orange is desired. This necessities printing type from two plates magenta and yellow in exact register. It is possible if type is large, if the type is small or light in weight the lightest imperfection in register will show.
- 6. When printing in reverse is appeared on a colour formed by over printing two/more plates, the reverse printing must be on both the plates. Unless they are printed in very close register, the type will not appear as clean white. In reverse printing, naturally the smaller type, the more critical the problem.
- 7. Type printing in reverse should be within a dark area to preserve legibility. As a rule, it is best to avoid reverse in tone below 40%.
- 8. Often the artist prepare art for reproduction by overprinting one screened colour on another and applies the screen to the art work. Improper angling of the screens must be avoided for it results in an undesirable moiré pattern.

#### Choice and Effective use of Colours: colour is selected for the following functions

- ✤ To attract the attention
- To produce psychological effects
- To develop associations
- ✤ To build retention and
- ✤ To create an esthetically pleasing atmosphere

**To** Attract Attention: This is the major use of the colour, contrast is the basis of attention. Thus the addition of the bright colour to black increase the attention getting value of the piece.

When we say, "attract attention" we refer two separate responses from the reader. First, he is attracted, then he pays attention then it holds meaning interest.

Colour should be applied to the elements of great significance. One colour plus black offers great contrast. Many colours are selected to give black effect.

**To Produce Psychological Effects**: The colours that predominate the printed piece should fit the overall a mood of the message. The cool and warm colours suggest formality and informality. Red implies life and moods and ideas such as action, passion, gaiety. Blue connotes distinction, reserve serenity. Green is nature, purple splendor and pomp and white purity.

**To Develop Association:** Designer/printer should associate certain colours with different products. Red is happily associated with cherries, while the thought of green with fresh meats is not pleasant. Personal judgment cannot always be trusted.

**To Build Retention:** Colour has high memory value, communicator can capitalize upon something. Colour helps the reader to remember what he saw. Advertisers are particularly interested in reader to recall of the message and repeat certain colours in their products to establish product identification.

**To Create Pleasing Atmosphere**: The misuse of colour in a message/ job is worse than the use of no colour at all. Colour may get the initial attention but, unless it is sustained and developed into interest, the reader will not spend time to absorb the message. Poor choice and application of colours can repel the reader immediately after his attention has been aroused.

Colours, including Black, Gray and White should be arranged in accordance with the typographic principles of layout: Balance, contrast, proportion, rhythm, unity, harmony and movement.

Balance comes from the placement of the elements by weight. Colour adds further weight to the elements. when used with black for two colour job, the colour should be given relatively light weight so that it will not draw undue attention from the black. Solid colour should be reserved for emphasis.

#### **Summary:**

- ✤ The chapter journeys the student through various aspect of design.
- Solution theory is explained along with the inter relationship between light and colour.
- Basic differences between additive and subtractive colour are explained to drive the point that the additive colours depend on light theory while subtractive colours depend on pigment theory.
- The chapter explains the role of colour family clearly demarcating the primary, secondary and tertiary colours.
- ♦ Basic colour separation theory makes the heart of this chapter.
- Colour management explained enables the student to put in practice what he has learnt about basic colour theory.

#### **Short Answer Type Questions:**

- 1) Define Colour?
- 2) When there is no light, there is no Colour? Explain?
- 3) What are Additive colours?
- 4) What are subtractive colours?
- 5) What is Hue?
- 6) What are Value and Chroma?
- 7) What do you mean by double split complementary colours?
- 8) How are colours separated?

#### Long Answer Type Questions:

- 1) Explain the Basic colour theory?
- 2) Explain the Additive and Subtractive colour theories?
- 3) Explain about Colour family?
- 4) Explain about Separation theory?
- 5) Write about Choice and Effective use of colour?
- 6) Describe about Colour Management?
# UNIT 4

# **Image Assembly**

## **Structure:**

- 4.1 Stripping and Proofing
- **4.2 Imposition Rules**
- **4.3 Proofing**

### **Learning Objective:**

To define stripping and understand imposition.

To learn various parts signature

To plan various imposition scheme

To understand negative assemble

To identify different equipment used for firm assemble

To understand proofing and its significance

To compare commotional proofs and digital proofs

# 4.1 Stripping and Proofing

#### 4.1.1 Stripping

To assemble images on film for platemaking, Stripping involves correcting flaws in film, assembling pieces of film into flats and ensuring that film and flats register correctly called film assembly and image assembly.

#### 4.1.2 Proofing

Proofing is a process used for quality control in press and printing regarding colour reproduction, register, text and image layout, or as a specimen for the production run. Proofs are differentiated into analog and digital according to the type of original.

#### 4.1.3 Imposition

Imposition, or layout arrangement, must be established for a job that is to be printed on both sides; the images must back up correctly. If a job is divided into pages, pages should be arranged (imposed) in the correct sequence when the sheet is folded.

Verification of margins, trims, and fold marks is made. When a job sheet is to be folded into pages, margins are usually indicated on all edges of these pages. Where illustrations "bleed" into margins, the illustrations should be at least 1/8 in (3mm larger than the margins). A bleed is a printed image that extends all the way to at least one edge of a trimmed page. A full bleed is an image that extends to the edge of all four sides of the sheet; there are no visible margins because there might be variations in the printing or trimming. The bleed extends pas the trim (generally 1/8 in.) into the trim allowance. When cutting follows printing, the trim marks in the layout should permit standard cutting practices. Fold marks must be positioned in accordance with the capabilities of the folding equipment. Layout is a very important phase of image assembly, but it causes concern because the factory involved in working up a new layout is not generally understood.

There are several kinds of layouts. A mechanical layout, drawn up by the artists show s how the job should look. An imposition layout prepared by either stripping or bindery departments shows how images should be positioned on the sheet to meet press, folding, and bindery requirements. A film assembly layout drawn by the stripper shows accurate reference lines for the positioning of the film negatives (or positives) on the flat.

#### **The Book Signature**

**Parts of a signature**: A signature consists of pages. Trim size of a page is the dimensions of a page after the final trim is made. Type page size is the dimensions of the body (text matter) on a page excluding titles and page number (folios); i.e., the image area inside all margins. The top of a page is called the head, and the space from the head to the top of the trimmed page is called the head margin.

The bottom of a type page known as either the foot or tail and has a margin called foot margin or tail margin. The margin next to the fold is called the back margin, binding margin or gutter margin. The outside vertical margin is tile front margin.

The left-hand pages are called verso pages, and the right-hand pages are called Recto pages.

In book work, the book title or a chapter title is generally put at the head of each page and called a running head. With most books, the page number or folio is at the head, oil the same line as the running head. (Recto folios are odd numbers; as verso folios, even numbers). Running should be used in positioning the page so that the pages line up. If a job is having been properly assembled and then backed up correctly on press, these lines fall directly behind each other. In magazine work, the publications title is generally positioned at the foot and is called a running foot.

With magazines and some books, the folio is usually at the bottom of the page and called a drop folio. A foot margin should be established from this line and then used in positioning the page.

Any printed material that is perfectly centered will appear, to the eye, to be low on the page. It is necessary to position the material a little above center so that is appears centered to the eye. This positioning is called optical centering.

A well-balanced page has the type page made up on proportion to the trim size. When establishing margins, the stripper chooses some measure so that the size of the back margin is 1 unit, the head margin  $1\frac{1}{2}$  units, tile front margin 2 units, and foot margin 3 units. This set of margins gives a page that is optically centered and two-page spread that is centered horizontally.

A convenient method of checking to see if pages are imposed in correct position is to add the sum of the high and low folios. All pages that are in a printer's spread will equal that sum. A printer's spread is a pair of pages placed across a fold from each other in printing. In a 96-page saddle-stitched magazine (composed of three 32-page signatures), page 1 and 96 appear across the fold from each other and the high and low folios. Their sum is 97. Every printer's spread in this magazine adds up to 97 unless a page is out of position.

A pair of pages that are across the gutter from each other after the book is assembled is called a reader's spread. A break across is a photograph or other image that spread across two pages.

Often, it is on a reader's spread, consequently the break across required special considerations when printer's spreads are being assembled, ordinarily two duplicates are made from a halftone negative. (It is usually best not to cut the original negative).

The original negative should have two marks indicating the fold break and a horizontal mark scribed before making the duplicates. These marks are references for stripping. Then the two portions of the negative are carefully located, making sure that the break line falls exactly on the fold and that the portions align vertically. Next, the negative is masked off carefully with tape at the fold. Particular care must be taken to make sure the copy is properly placed vertically so that it will align after printing and folding, since nothing can be done if it is stripped in an incorrect position. Scribing these locating lines in advance makes positioning of the halftone easy. If these lines are not scribed in advance, then it will be necessary to measure each half separately, which is almost impossible to do accurately.

#### **Planning Imposition Schemes:**

We will now look at the planning of work which when printed is folded.

**The imposition**: This term is normally used to denote the positioning of book pages which when printed, folded and trimmed will follow in the correct sequence.

Imposition in this sense is often assumed to apply only to book work, but it is equally applicable to any folded work.

**Imposition terms:** The terminology used in connection with imposition is as follows

**Heads**: This refers to the white space at the head of the book page and the space between pages placed head to head on the layout

Foot: This refers to the base of the page.

**Fore-edge**: This is the white space on the outer edge of the book page Backs. This is the white space between pairs of pages which when folded becomes the back of the book.

**Gutters:** This refers to the space between pages with their fore-edge together within the imposition layout.

**Tails:** This refers to the space between pages with their feet together within the imposition layout.

Folio: This term is used when referring to the page number

**Perfection**: Also called backing-up, this refers to the printing of both sides of the paper in one pass through the press and loosely applied to the printing of sheets on one side which will be perfected by passing through the press a second time.

**Imposition Schemes :** The different types of imposition schemes are as follows

- Sheet work
- Half sheet work or Work and turn
- Work and tumble

#### Sheet work :

- 1. These method of printing book requires a separate plate to print each side of the sheet.
- 2. The outer carries the first and last pages the inner is backup plate

#### Work and turn :

- 1. This method of printing requires one plate from which both sides on the sheet are printed.
- 2. The inner and outer section of both printed on the plate in such away that when the printed sheet is turn over on the axis of the short cross and backed up it can be cut into two copies.

#### Work and tumble :

- 1. This method of printing requires one plate is used to perfect the sheet producing two copies.
- 2. The sheet however is turn over on the axis of long cross.
- 3. This method is used for imposition schemes such as the twelve page which cannot be perfected by the work and turn method.

# **4.2 Imposition Rules**

All imposition layouts for lithographic printing are prepared as they will appear on the printed sheet. The layout must be laterally reversed for film assembly and the "planning flat" (the completed assembly) is laterally reversed on to the plate for printing down.

- The folio is drawn in at the foot of the page and underlined.
- The folio should be drawn the right way up on each page.
- All schemes should indicate margins, axis of backing up, cuts and trims.
- Collating marks and signature notation will appear on the "outer"
- The imposition for the sheet work is the same for work and turn. To produce the sheet work outer and inner schemes simply part the work and turn imposition on it axis line.

**Signatures:** when book work involves two or more sections, each section is called a "signature" and is identified by an alphabetical letter or number placed at the foot of the first page of each section.

**Collating marks:** To facilitate the collating of each signature into its correct sequence within the book, a collating mark (or "Black Step") is printed on the spine of each section between the first and last pages. The collating marks are progressively steeped to enable a quick visual check to be made when the sections are gathered together.

**Inner and Outer pages**: Imposition schemes produce inside and outside pages of various sections. In a four-page scheme pages one and four are called 'Outer' and pages two and three are called 'Inner'. When additional four-page section are gathered together for sewing, side stitching and stabbing the pages number will continue.

When two four page sections are inset for sewing or saddle stitching the page number will fall .

### Imposition Schemes for two or four sheet methods sheet and half sheet methods

Imposition is normally used to denote the positioning of book pages which when printed, folded and trimmed.

- 1. For two pages sheet having one front of the page sheet and one back of the sheet.
- 2. For four pages sheet having two and three in front of the sheet and one and four is back of the sheet as shown in Below figure 4.1



Fig: 4.1

To obtain accuracy during planning and for checking and final imposition the following rules are applied for eight-page work and turn printing.

- 1) Page one will appear in the bottom right-hand corner of the sheet with the foot of the page nearest the leading edge.
- 2) Page two will be in line page one, across the short axis of the sheet.
- 3) Pages three and four occupy the remaining corners of the sheet following a clockwise direction.
- 4) The second half of the sheet follows the first half in an anti-clockwise direction.
- 5) The first and last pages of the section always make a pair appearing side by side.
- 6) The sum of each pair of pages will be equal to the sum of the first and last pages in the section
- 7) The center pair of pages will appear head to head with the first and last pages of the section. shown in fig: 4.2



fig: 4.2

#### Sixteen pages work and turn method:

For larger imposition schemes additional rules are applied. The following example show the rule for 16-page work and turn printing.

- 1) Page one will appear in the bottom left hand corner with the fore-edge of the page nearest the leading edge.
- 2) Page two will appear in line with page one across the short cross axis of the sheet.
- 3) Pages three and four will follow in an anti-clockwise direction.
- 4) The second quarter beginning with page five follows the first quarter clockwise, head to head
- 5) The second half beginning with page nine follows the first half anti-clockwise, side by side

6) The fourth quarter beginning with page 13 follows the first quarter clockwise, side by side. Fig :4.3 shown sixteen pages work and turn method.





**Numbering the pages of the dummy:** To enable the pages of the dummy folded section to be numbered in the correct sequence, a 'V'shape is cut with a sharp knife through all the pages. The 'V' slips can be easily numbered and the point of the 'V' will indicate the foot of each page when file dummy is opened flat.

#### **Inspection of Films for Assembly:**

Any printed product must be inspected to evaluate and maintain its specified quality level. Inspections during the different stages of reproduction permit corrections to be made at the earliest possible time. Inspections prevent excess labor for being applied to an unacceptable product.

The stripper, proof reader and customer use a proof to check the film and its contents after assembly. However, the stripper checks the film prior to and continuously during film assembly.

Prior to starting assembly, the stripper checks the films for the following characteristics, Image quality consistent with job specifications.

**Unbroken type**: Minor imperfections are corrected by scribing on negatives and opaquing on positives. If the number of corrections is numerous, the film should be rejected.

A minimum of pinholes, opaquing on negatives and scraping on positives fixes pinholes. However, if the number of pinholes is excessive, the film should be remade.

Colour-separation film properly sized and with proper screen angles.

Proper camera or contact films provided. Contact films, such as spread negatives and duplicates are often made by stripper. All film used to assemble the flats should be on the same type of base; that is, if a mixture of camera and contact films are supplied, all the camera films should be duplicated using contact film and only the contact film used for assembly. Images that fit. Proper orientation of images i.e., right reading or wrong reading.

The stripper also continuously checks the films and flats during assembly to assure satisfactory conditions, as follows:

- 1) Image quality maintained i.e., images not scratched or cut through during film assembly.
- 2) Films assembled into proper flats.
- 3) Flats labeled.
- 4) Image acceptable, whether overprints, multicolor images, or close-fitting single-colour images.
- 5) Proper positioning of film images according to imposition layout.
- 6) Use of complementary flats where necessary accommodation for press grippers
- 7) Press maximum image size not exceeded.
- 8) Assembly of images so that the number of film layers on a single flat is minimized for better contact during the preparation of the image carrier
- 9) Proper orientation of film images- right or wrong reading as required by the image carrier
- 10) Correct allowances for trimming and folding.
- 11) Accurate registration of process- colour images preferably using a key flat.

#### **Negative Assembly:**

**On Golden rod paper**: This method is widely used to assemble negative book work imposition and multi-image work where duplicate negatives are supplied. No high degree of accuracy is obtainable due to the dimensional instability of the paper. It is just a yellow coloured paper made to specific requirements, uniform of gauge etc.

**Method of working**: A sheet of golden rod paper larger than the plate size is ruled out with the layout imposition. For correct assembly, the layout must be drawn laterally reversed. The negatives are assembled and fixed with the emulsion side of the element upper most. The completed assembly is then turned over and placed with the emulsion side of the negative in contact with the plate coating prior to exposure. When the negatives are in position together with the register marks, trim marks etc. the assembly is then turned over on the light table. The planner must now cut away window section in the goldenrod layout in the image areas of the

negatives. Cut the windows as close to the work as possible to gain maximum masking effect. Care must also be taken to remove the goldenrod from the work areas. Avoid cutting too deep to prevent the film surface getting marked. Take care not to cut right through the film.

**Goldenrod with plastic leaf**: This involves identical preparation as above but a clear sheet of plastic is used as actual assembly substance. This gives added dimensional stability.

**Method of working**: Ruled sheet of goldenrod is positioned on a light table; clear plastic sheet is attached to the goldenrod layout. The sheet should be large enough to support the film elements, register mark, quality control aids etc. when they are secured together, the negatives are fixed in the position on the plastic sheet with tape and window cutting is made.

**Peelable membrane**: The layout must first be prepared by ruling out on a stable material such as manila. Strong fine lines must be drawn with special fine pencil or pens. The layout lines and marks are viewed through coloured masking substrate.

The next stage is to position and secure the frisk substrate to the layout with the membrane side in contact with the layout. The negatives, register marks and any other items are now assembled on the non-membrane side of the masking substrate with emulsion side uppermost. Align negative marks with layout line using a magnifying glass. When the assembly has been completed, check the layout. The assembly is now turned on to bring the membrane

side uppermost. The membrane masking may be removed from the image areas and in places where the register trim and fold marks are to be printed down.

Cut using a sharp blade close to the work keeping within the area of the negative corner of membrane is lifted with a blade and section away by gripping between the thumb and the fore finger. The assembly is now ready for printing down on the plate.

#### **Complementary Flats:**

It is frequently desirable to divide the printing details for a press sheet between two or more flats. This is commonly done when the printing detail consists of many small illustrations with close-fitting text.

In such work, the films would be troublesome to splice together and could cause plate making difficulties. The division of detail is also necessary where printing is to surprint or print over other printer matter.

The complementary flats are exposed successively in register with each other to combine their details on the same sensitized press plate. Location register between the flats is

obtained by adding register marks, by use of butterfly cut outs, or with the aid of plastic hole tabs attached to each flat.

If hole tabs are used, mating sheet plastic dowels must be temporarily secured to the press plate to register the two flats to the same location.

#### **Double Printing and Surprinting:**

Double printing and surprinting are photographic procedures that are used to combine the detail from two or more films into a single film. This is done to simplify stripping practices. By combining printing detail into a single film, it is possible to eliminate the close-fitting of film sections and the need for complementary flats. This is used for combining close-fitting line and half tone detail. The photographic combination also improves the quality of the printed reproduction. The single film eliminates out-of-contact difficulties and provides a more opaquer dot structure that can be obtained from the original camera halftone negative or positive.

#### **Equipment for Double Printing and Surprinting:**

Double printing and surprinting require darkroom processing facilities, a vacuum contact printer and a point-source exposure light. The dark room methods for exposure and development of the film are described elsewhere in this manual as they usually done by the cameraman or by a specialized contact man. The stripper is required to prepare the negatives or positives so that they can be double printed or surprinted accurately in relation to each other. He does this by using one of the following methods.

#### Flap methods:

This requires a supporting base such as a sheet of as thick plastic pressed-board or a section of metal press plate that is free from kinks. The base size must fit within the contact frame. The two negatives to be double printed (or surprinted) are first registered to each other. They are then trimmed if necessary so that each negative has one side that projects beyond the margin of the other film.

A white sheet of paper the size of the film that will be exposed is placed on the base. The two films are then carefully registered to each other in position on the paper, ash film is then taped on the baseboard along its extended side. In this way, each negative will be hinged to the supporting base. If the negatives are small, the hinged sides can be opposite each other. If the negatives are large and nearly fill the contact frame they are usually hinged along the same side with separate strips of tape. In use darkroom safelight conditions are employed.

The sensitized film to be exposed is place emulsion-side up on the base in place of the white sheet of paper. It is taped down securely. The first flap negative is lowered over the film.

The vacuum frame is closed, the air exhausted and the first exposure made vacuum contact is then released. The second flat is lowered against the sensitized film in place of the first and the second exposure is made.

If the negatives were large and hinged along the same side, the sensitized film is secured only along the opposite side to that used for the negative sections so that it also is hinged to the base. The sensitized film is first interleaved between the top and lower film and the first exposure is made. For the second exposure, the top film is removed and the sensitized film is hinged below the second film.

#### **Punched Hole Methods:**

Registration for double printing or surprinting two films may use standard peg-boards and a punch fixture for punching the films. Punched holes and plastic dowels can also be used.

The two films to be double printed or surprinted are first registered to each other over a light table. They are then taped securely to each other to hold register. The two films are next punched together along a waste margin to obtain two register holes. (Three holes can be used for large films.)

The final stage common to all graphic reproduction processes is finishing operations. The product of the pressroom is a printed press sheet and generally is unusable in that form. This sheet must in most case have further operations applied before it becomes a finished product ready for use. In-line finishing with the printing press is becoming increasingly common. However, whether finishing is in-line or off-line, similar steps must be taken during film assembly to provide for the desired end result.

The finishing operations can be separated into several steps: folding, trimming, assembling and binding. Some jobs require only one of these steps to be taken to finish the product, others may require all steps to be taken.

Folding is the laying of one portion of a press sheet over another portion in such a manner that the pages are in proper sequential order and alignment, even when page number or folios are not used. Such a folded sheet is called a signature.

During film assembly, the stripper must properly position the various pages of the signature, so that when the sheet is folded the will be in correct order. Different jobs may require a different ordering of the pages, the striper must take this into account. In addition, the stripper must include fold marks (usually dotted or broken lines) on the film flat.

Trimming is the cutting of press sheet, a felted signature, or an assembly of signatures to final size, during film assembly the trim marks must be added to the flat to show the final size of the printed product.

Assembling is the gathering (or stacking of signatures one on top of the other, the inserting of the one signature into another or the collating (or stacking) of individual cut pages one on top of the other. Of these three facts of assembling one, gathering, requires the stripper to include collating marks along the outside fold, or spine of the folded signature, these collating marks are typically placed increasingly lower on the spine with each subsequent signature.

Binding is the fastening together of the pages or signatures. A variety of methods are used each requiring different treatment during film assembly. Examples of binding methods include padding, perfect binding, stitching, mechanical binding, loose-leaf binding and case binding.

#### **Equipment and Tools:**

Good film assembly work requires not only competent craftsmen but also a satisfactory work environment and suitable tools. The stripping department is a production department that should arrange to facilitate the production of flats 44 for peacemaking. Many time the stripping department is considered secondary to the press department and crowded into limited space with poor production facilities.

A better approach is to recognize it as an important area in the control of quality and to provide adequate stripping facilities.

**Equipment:** The equipment selected for film assembly must be of the quality levels required for the normal printing produced. It must also permit efficient operation without undue strain or inconvenience to the user. The units must be rugged and durable so that they will retain their accuracy and rarely break down. It is false economy to buy low-quality stripping equipment because the lost time resulting from breakdowns, in accuracies, and inefficiencies of cheaper equipment is very costly.

#### **Stripping Table:**

The primary function of the stripping table is to provide an illuminated work surface on which films can be positioned and assembled to make a flat. The table should also be bright enough so that pinholes in negatives can be located and opaqued.

The table should be of satisfactory height and preferably freestanding to permit the stripper access to all sides of the flat.

The table's working surface is a sheet of a plate glass, usually grained or sandblasted ("frosted") on the underside to diffuse the internal lighting. This glass top should be larger than the largest layout sheet used. The internal lighting usually consists of several lamps located to provide a uniform distribution of light over the entire work surface. White or cool white fluorescent lamps are preferred. Internal reflectors and diffusers may be used to help improve the uniformity of the light. There should be no evidence of hot spots or glare streaks. High concentrations of light tire the eyes, and hot spots can cause paper or film to change size. A two-level illumination system is desirable to permit increasing the light intensity when it is necessary to prepare flats on top of standard layouts or other flats.

On large tables, the glass should have enough support strength to hold some weight. However, the stripper should never put his entire weight on the glass. The stripper should instead develop the habit of supporting his body by leaning against the edge of the table when reaching towards the center of the table.

Some stripping tables are equipped with straight edges on two or all four sides. If these edges are machined, ground two, and square, they permit the stripping table to serve also as layout table. If it is often used in this way when the stripper is working on small forms when great precision is not needed. A straight edge should be checked for accuracy periodically. Strips of cold-rolled steel used for straight edges on low-cost equipment are usually inaccurate. Their irregular edges can cause a great deal of trouble when positioning and aligning film images.

#### Layout (lineup) Table:

A precision layout (lineup) table is almost indispensable for the efficient and accurate preparation of layouts and for checking the accuracy of the completed flat.

Every stripping department should have at least one. The layout table like the stripping table has a frosted glass top, illuminated from below. The table usually has two ruling bars one horizontal and one vertical, situated on gears for easy use. These micrometer adjustable straight edges may be equipped with carriages to hold scribing, ruling, and locating attachments. Some tables have digital readouts to show the position of the bars. In specialized plants, where ruled forms or similar ruled jobs are produced, the scribing and ruling attachments that come with some tables are especially valuable.

It is important to keep the table clean and free of bits of tape, and all gear tracks should be clean and unobstructed. This table should not be used for stripping and no cutting should be done on it. The table should be checked weekly for squareness and accuracy.

#### Work Table:

A work table should be equipped with shallow drawers to store completed flats, dummy layouts, complementary flats and other reference material required during the assembly process. The drawers will also serve as dust-free storage spaces for working stock, flat material, tint sheets, and masking supplies. A work table should be located near every stripping table.

#### Filling Cabinet:

After the flat has served its purpose for peace making, its disposition must be determined. The flat represents an investment in labor and material, including the cost of copy preparation, camera work, and stripping some flats are outdated immediately after the job is printed. But even these flats should be held for a time after the press run and delivery are made because the customer may question some detail or may request reprints with some modification. Other flats may be reused from time to time with or without changes.

For the safe storage of flats, the stripper must guard against damage or deterioration. Protection must be provided against scratches, breakage, excessive humidity or temperature changes, tire, water, accidental sprinkler damage and other hazards. Flats should not be stacked in piles, if they are distortion can result from the pressure of the pile. Also tearing can occur when pulling a fiat from the stack. Storage cabinets with shallow drawers protect against these dangers. In another storage method, beats are placed into corrugated cardboard folders, which are stored in an upright position according to job number.

#### **Static Eliminator:**

A number of static eliminating devices can clean film sheets of various sizes with good housekeeping eliminates most dust and keeping relative humidity constant minimizes electrical charges, a static eliminator located near the accurate the charge on the film to keep it from picking up any dust or dirt.

#### **Contact Frame:**

Contact printing is an integral part of the film assembly operation, whether it is done by a stripper or by a specialized contact person. A contact printing frame is the device that holds the image and the unprocessed or fresh photographic materials together. The contact frame is used to make duplicates of negatives, to make shrinks and spreads, and to expose other photographic materials used for stripping. Contact frame consists basically of a light source with high ultraviolet output, a vacuum board with hinged cover glass to hold films securely in place during exposure, an electrically, mechanically, or air-operated vacuum pump, and some kind of device to measure exposure. A simple timer can be used but a light integrator is better because it controls exposure more accurately. If the vacuum is brought up slowly the trapped air inside the frame escapes more readily, the vacuum board must be larger than the largest flat made approximately one-third of its surface should be open to help evacuate air. A contact frame can be used in a darkroom. In the stripping department under safelight conditions, or in a normal room light, depending on the kind of film used.

Light diffusion can be a problem when exposing film. Any metal surface near the vacuum board should be painted black to prevent light from bouncing off it during exposure.

If the light source is overhead, the light rays should fall below the edge of the vacuum frame to avoid diffusion.

The vacuum frame is a potential source of dirt. Dust and dirt here are serious problems because they cause out-of-contact areas and spots on the film. The frame should be cleaned weekly or more frequently if necessary and vacuum pump flushed out twice a year with a fluid recommended by the pump manufacturer.

#### **Contact Frame Mat:**

The mat supplied with the contact frame is usually too coarse to be adequately drawn down pieces of film, so another finer mat is needed. Mats are commercially available, or an offset press blanket, turned so that the cloth side is upward, can be used. Whatever kind of mat is used it should be at least <sup>1</sup>/<sub>4</sub> in. (13mm) smaller than the bead around the edge of the permanent blanket and at least as big as the flats or plates put in the frame.

The vacuum pin board can be fitted with a pin register system to make sure the films are held exactly in place. Some pin boards are equipped with retractable register pins.

#### **Register Punch:**

Pin register equipment provides accurate means to manually position films, flats, or plates. Register punches are used to put holes in materials to register them together. Register punches used for film assembly are specially designed pieces of equipment that are extremely accurate. They will punch different numbers and shapes of holes; e.g., round and slotted holes.

#### **Tools:**

As in an industry good tools are important. High-quality tools are a wise investment since they are more accurate and easier to use.

#### **Ruler:**

A ruler (also called a "scale" intended primarily for measuring and not for drawing or cutting straight lines, but a good quality ruler can be used to draw or cut short lines. Rulers are available in many styles and are made from many different materials. The best and the only ones that should be considered are made of stainless steel, with the divisions etched or engraved in the metal. Divisions printed on the metal are neither as accurate nor as permanent. Rulers are obtainable in lengths from 6in. (150mm) to several feet. If there are divisions on both sides of the ruler, the increments of measure should be the same.

There is a danger of parallax error in reading measurements from the side of a ruler, the measurement is accurate only if the reading is taken from directly above the marking. Using a ruler with a beveled edge reduces the chance of error. When using a square-edge ruler with indented markings, the stripper can reduce the error by standing the ruler on edge, taking a needle or hard pencil, and following the marking to the paper.

If work is being done where specifications are given in picas and points, good quality rulers with printer's measurements called Saline gauges are used.

#### Straightedge:

A straightedge is used for scribing negatives and for drawing long, straight lines. A straight edge is usually a heavy steel or stainless-steel bar. It should have a beveled edge that is machined and ground true. Care must be used in handling a straightedge, because if it is dropped and becomes bowed its accuracy is destroyed. Any cutting tool used with a straightedge must be used carefully to avoid scraping the material or nicking the surface.

#### **T** Square and Triangle:

A steel T Square is useful for aligning small section of film. It can be used for drawing short lines, but is usually not rigid enough to be used to accurately draw number of lines longer than 16mm (400) because the port of the blade from chest to its head tends to flex. A good T square has its blade inserted or pinned at right angles to its head. The blade and contact face of the head should be ground true. Only the upper edge of the blade should be used.

A steel triangle is used in conjunction with a straightedge. T-square for drawing vertical lines or for lining up negatives. A precision triangle has edges that are ground at perfect angles. The 300-600-900 and 450-450-900 right triangles are the most popular. It is advisable to have at least one large triangle, such as one with an 18-in. (460 mm) leg.

Two adjacent sides of the stripping table are commonly used to obtain right angles. However, it is hard to get the true sides perfectly square and even harder to make sure that they stay that way, since moving or bumping the table can throw it out of square. A much more Accurate and easier method of locating a right angle is to use a T square and a right triangle. The procedure is as follows.

- 1) The head of the T Square is held firmly against the tables edge with one hand and the T square is moved downward.
- 2) The triangle is placed against the T square blade and above it, and the stripper's hand is positioned side ways to hold both the T square and the triangle. Working in this manner ensures accurate right angles.
- 3) When T square's blade is away from this stripper, the head of the T square can be held snugly against the table by the stripper's body. This technique leaves both hands free to work with the triangle and whatever other tool is being used. For work that requires unusual angles a protractor or an adjustable triangle is used.

#### **French Curve:**

Unusual curves are drawn using a device often known as a "French Curve" or "irregular curve". This device is helpful when railing or drawing curved lines since some part of the curve can fit almost any shape. French curves are available in a variety of sizes and shapes. If a cutting tool is used with a French curve made of plastic, the tool should be held in such a way that it will not cut or nick the curve.

#### **Dividers:**

Dividers are used for positioning strips of film before they are taped down. They are also used to transfer measurements accurately from a ruler to a flat or film. Dividers with a thumbscrew adjustment are the most convenient to use because the legs can be lock in place so that a measurement can be transferred accurately.

#### **Compass:**

Circles and are drawn using tile compass. For transferring small measurements, dividing lines and angles or making parallel locations on the flat, the draftsman compass is often used instead of dividers. To prevent damage to the negative all the point of the compass needle should be covered with several layers of type so that the needle does not pierce the material on which it is resting.

#### **Beam Compass:**

A beam compass is used to transfer distances that are too great to be transferred using dividers. A beam compass is portable and can be used to compare measurements between flats. Better beam compasses are provided with two heads that can be locked in any position along

with the beam, each of the head holds either a steel point or a pencil lead. One head is manually positioned and locked as the starting point. The other has a micrometer adjustment to accurately set its point (or lead) to the engraved divisions on steel scale.

#### **Ruling Pen:**

The ruling pen is used for drawing border lines, for cropping illustrations with opaque, for retouching solid printing detail on films and for drawing rules on positives.

One disadvantage of the ruling pen is that its small reservoir must be filled frequently.

However, it can be adjusted to different widths, whereas the technical pen has a nib with only one width. When using a ruling pen, it is necessary to hold the pen vertically.

Pens must be kept clean and opaque or ink should not be allowed to dry in them, to get satisfactory service from ruling pen, sharpening is very important. Pen nibs should be properly sharpened to a narrow edge, if the nibs are blunt, the result is a heavy line that is hard to control. A fine oil stone should be used for sharpening the nibs. Nibs should be of an oval or elliptical shape and must be the same length. Care must be taken to avoid getting them too sharp or they will cut into the film. The pen must not be run off the negative onto the glass of the stripping table because glass will dull nibs. Opaque should be thinned sufficiently to flow freely.

If pencils are used for drawing layout lines, the hard-lead types (4H to 8H) are best. Unless there is some need to erase the lines, a fine-line ballpoint pen is preferred it maker darker lines than a pencil and never needs to be sharpened. When drawing a line, it is very important that the pen be held at the same angle for the full length of the straightedge or the line formed will vary in distance from the straightedge. A long nib keeps a pen from deflecting of the side of the straightedge.

When thick marks such as those used for identification are needed, it is best to use a black liquid marker. Special markers will write on any surface (including polyester sheets) and will not transfer to the glass of the vacuum frame when under pressure, eliminating the smudge problem that existed with the crayons that were widely used in the past. For making identification directly on negative, white liquid markers can be used.

#### **Technical Pen:**

A technical pen can also be used for drawing lines. It makes a fine line than a ruling pen, stores more ink in its reservoir and does not need to be sharpened. The pen has a tiny tube as its nib inside of which is a needle that retracts when the pen point is pressed against a surface. Such action permits ink to flow down the tube, but the ink flow stops when pressure is removed. No air reached the ink reservoir consequently the ink cakes less frequently than in other pens. To keep a technical pen operating properly it should be used regularly, rinsed daily with warm water

and kept capped when not in use. It should be cleaned periodically with commercial cleaners or with a solution of ammonia and water, ultrasonic cleaners will do the same job faster.

#### Knives, Razor Blades and Shears:

Cutting tools are an integral part of the stripping operation. They are used to cut windows in flats and masks, to cut film and to peel away material. If cutting tools are manufactured from high-quality metal, the blades will remain sharp longer. There are many types and styles of knives, most have replaceable blades and the handles may be either round or flat. The important point is to get a knife that is convenient and comfortable for you to use as it is generally very hard to switch from a round-handled knife to a flat one and remain accurate. Knife blades should be kept sharp so that the same amount of pressure is exerted each time film is cut. Heavy pressure applied to a dull knife blade to cut through film is what causes scoring in the light table glass. To avoid scoring, it is best to put a piece of waste film or plastic under the film being cut. For cutting masking films, swivel-bladed knives are convenient once the stripper masters their use.

Single-edged razor blades are often used in place of knives as stripping tools.

They are relatively inexpensive and easy to use. Once dulled they must be disposed of properly

A light weight pair of shears of scissors with approximately 10"1(250 mm) blades is desirable for trimming films or cutting sheeting, especially polyester types.

#### **Tweezer and Stripping Tool:**

A Tweezer is handy for removing sections of peelable masking films and for picking up small pieces of film. A stripping tool has a blunt edge that makes it easy to lift peelable masking film.

#### Lithographic Needle:

Lithographic needles are available in many different diameters and cross-sectional shapes. They are best sharpened on a stone, using successively finer oilstones. A grinding wheel should not be used since the needle is small and overheats easily. Too much heat destroys the temper of the steel. The needle should be examined with a magnifier and tested for a satisfactory

edge. With most lithographic needles, the metal extends up into the handle so that if a point is broken off, the wood can be cut back and point re-sharpened.

A round needle is usually sharpened to a gradually tapered point. It is used to mark locations on a film or flat and to transfer locations from one flat to another. With very small pieces of film the needle can be pricked into it, a practice that aids the stripper in picking up the film or sliding it into a new position before taping it down.

Needles with square or flat rectangular cross sections can be honed to a sharp edge to serve as scrapers in correcting photographic defects in the film emulsion.

Examples of such defects are broken type characters and small streaks in halftone dots that may have resulted from a scratched contact screen. It should be noted that making corrections on any of the polyester based films is much more difficult than on acetate based types. In making a correction the stripper must remove all of the unwanted emulsion to prevent the area from closing up again when the negative is put under pressure in the vacuum frame. Some flat needles can be sharpened for use as stripping knives and others as scribing instruments. However, needles are not as satisfactory as tools made specifically for these purposes.

#### Scriber:

For scribing on film (drawing lines on the emulsion of a photographic negative) there are number of different styles of tools. Again, the style chosen is a matter of personal preference.

The most important thing to remember in any ruling operation is that the emulsion must be completely scraped away and the edges must be left smooth not ragged.

Scribing on film gives much faster. Scribing is recommended for business forms and other work requiring lines. Increasingly computer aided masking systems are being used to create ruled forms.

#### **Screen Angle Indicator:**

A screen angle indicator is a necessity for colour stripping. It is used when laying down tints to make up colours with process inks and when laying tints of colours over existing halftones. Several indicators are available commercially.

The GATF screen angle guide is available in two versions, one for conventional angles  $(45^0, 75^0, 90^0 \text{ and } 105^0)$  and one for laser scanner angles  $(45^0, 71^0, 6^0, 90^0 \text{ and } 108.4^0)$ . The guide can be used with any screen ruling (120, 133, 150 lines etc.) it is extremely accurate even when only the naked eye is used. It includes a screen ruling measurement scale.

#### **Screen Ruling Measurement Scale:**

A method is needed for determining the ruling of screens used for halftones. Commercial scales are available and consist of screen patches of various rulings. The correct ruling is determined by selecting the patch that shows the largest moiré pattern that will disappear as the scale is rotated over the halftone screen. These scales are particularly valuable when adding screens to overprint halftones that have been furnished from outside sources. Within a plant, there may be only one screen ruling used, so the need for determining screen ruling does not exist. For occasional use, the stripper can save several small sections of screen tints of known rulings, such as 120 lines per inch (47 lines per centimeter), 133 lpi (52 lpc), and 150 lpi (59 lpc), marking each of aid in its use.

There are occasions in using the screen when the moiré will not completely disappear. This condition is caused when a screen's ruling and that of the measurement scale do not perfectly match. If a screen tint is for example 132 or 134 lines per inch and is checked with a 133 line per inch measurement scale, the pattern will never completely disappear. European screens, which are made to metric measurements also cause problems in the determinations of the correct ruling.

#### Magnifier:

Several types of magnifiers are used by the stripper. A low-power stand supported retouching magnifier is useful for opaquing out pinholes and defects in printing areas, such as between rows of type but one should not become dependent on this type of glass for all retouching work.

A higher-powered magnifier is helpful for fine detail work. This magnifier should also be supported by a base so that it rests on the work in a fixed position. Such a magnifier is useful for repairing halftone dots or time type.

A fountain-pen type, or shop, microscope is very valuable in examining halftone clots for adequate density. When evaluating screen tints with a magnifier, the stripper should always use the same glass because using the same magnification provides greater accuracy in determining values.

Magnifiers are an extension of eyesight, and they should be selected for good liability. The better magnifiers are colour corrected (achromatic) and may be surface-coated to reduce surface and internal reflections. There is a considerable confusion in the commercial rating of magnifiers, and terms such as "power" and "enlargement" may be misleading. When buying a magnifier, the stripper must be sure of what is being purchased. For example, a sixteen-times enlargement of area is only a four-times enlargement of the linear dimension.

# **4.3 Proofing:**

Proofing is a process used for quality control in pre press and printing regarding colour reproduction, register, text and image layout, or as a specimen for the production run. Proofs are differentiated into analog and digital according to the type of original. Analog proofs are produced photomechanical from films that have been exposed, for instance, using colour foils. Digital proofs are produced using NIP technology-based colour printer (normally based on ink jet or thermal sublimation processes) from the digital data file. The expected print result on a production press should be reproduced accurately as possible. This is supported/achieved by using colour management systems.

Sample print on a printing system in a small run length shows the result of the production process, where by the technology of the proofing system corresponds to the printing process used for the print run/job.

#### **Purpose of Proofing:**

The primary goal of proofing is to serve as a tool for customer verification that the entire job is accurate. Prepress proofing (also known as off-press proofing[4]) is a cost-effective way of providing a visual copy without the expense of creating a Press Proof. If errors are found during the printing process on press it can prove very costly to one or both parties involved.

Press time is the most expensive part of print media. The main objective of proofing is to produce either a soft or hardcopy of what the final product will look like on press. Hard copy proofing usually involves ink-jet printing or other technologies (i.e. Laminate Proof[6]) to produce high-quality one-off copies of the production art work. Soft proofing usually involves highly colour accurate wide-gamut computer displays.

"The printed proof is a dispassionate simulation of the ultimate output a CMYK press sheet. The mission of a proofing system is to create accurate predictions, not pretty pictures."[7] In the best conditions, the proofing process will try to emulate the effects of the printing press through colour management and screening techniques which can be quite challenging because proofing devices may behave and operate quite differently than press devices.

#### **Digital proofing:**

Digital proofing processes are used to output a digital data set to create the most accurate possible simulation of the print product to be produced. In most cases the most important factor is that the proof visually matches the later print quality. Special printing parameters (e.g., dot structures) can only be reproduced in the print run using special proofing processes (true proof, screen proof).

The digital proof is of central importance for digital imaging printing systems (e.g., direct imaging system: Quick master DI, Heidelberg). Films which usually form the basis for proof manufacture with analog proofing processes are no longer produced during production. Prior to imaging the printing plates within the press, a check must be performed to assess whether the Yakut if the data is in line with the commissioned product. In the example given a thermal sublimation printer is used for the proof. The entire format (A3+ means a little larger than the DIN/ISO standard A3 size) is reproduced in true colour with a powerful colour management system. Digital proofing systems can be at the outset be classified into two basic process variants based on intended user and quality required.

- a) Soft Proof
- b) Hard Proof

#### Soft Proof:

Soft proof describes the simulation of the print result on a monitor, if previous soft proof applications were simply a display of the image in colour to check for completeness and status of the print file, a significantly improve colour reliability has been achieved since the arrival of the PDF data format and additional software applications (viewer) in combination with colour management systems. The colour reliability of images on the monitor depends heavily on the viewing conditions, and colours do not always match those of the printed copies. While the colour-reliable representation of the image on the screen normally requires a darked room, a sample print must be viewed under standard light conditions close to made from the virtually perfect simulation of the later print quality on the monitor, soft proofs offer interesting, forwardlooking solutions for the co-operation between customer and service providers in reproduction technology.

In so called "remote-proof" applications, files can be sent rapidly via global networks and later print runs simulated on site with the customer. colour management systems perform a key function when implementing this kind of production scenario.

Solution that have already been realized such as those shown to display the trend towards image assessment on the press monitor, where it is possible to zoom into the level of the halftone data for checking the dot structure (screen proof).

#### Hard proof:

Hard proof can be further divided into five general classifications which are described below.

#### **Blueprint:**

To gain an initial overview of the contents, imposition layout, and completeness of a data set to be printed, a single-colour blueprint can be created. The term which is confusing in the context originates from conventional plate making. Here a so called "Ozalid/diazole copy" (which is monochrome and blue due to the process involved) is produced after assembly and offers information about the completeness of the pages, their position on the sheet, and the imposition layout. In digital printing technology, this technical context no longer exists. Blueprint has become a generic term.

#### **Imposition Proof (Layout Proof):**

To gain a colour impression (but not colour reliable) of the file with the same aim as a blueprint (checking the contents and position of the image elements), a layout can be created. Today, blueprint and layout proofing are applications ideally suited to reasonably priced large-format printers and are normally equipped with ink jet printing units. Due to the universal and device, neutral addressability with the post- script page description language, the original printing data can be output via multitude of printing systems (typically assigned to the "large format printer" category) with the most diverse of quality parameters (resolution, gray levels, type of paper, quality of colour).

#### **Colour Proof:**

In practice, the process most commonly understood under the term digital proofing is "colour proof".

In the printing industry and in the context of high quality prints, this proof provides the colour-reliable/colour-true production of the contents of the file intended for printing. More and more standard printing system are being used for this, such as ink jet printers four-page (A4+ format or thermal sublimation printer, two-page format) in combination with powerful colour management system. The colour proofs created in this way serve as a guideline (reference) for the printer in charge of the production run.

While it is possible to work predominantly with small page formats in the creative phase, it is desirable both for printing and for finishing carrying out an inspection of full-size original or the original digital file in the full-size print format. Reliability is the most important aspect here. As a rule, robust systems with low follow-up costs are obviously preferred in such circumstance. The decision as to whether the proofing system is toner-ink or foil (colour donor) based must be made on the merits of each individual case.

#### Screen Proof (True Proof):

If the screen structures of the later printing procedure can also be simulated using a digital printing process, the term screen proof is used (also true proof since with this level of quality reproducing the dot structure too, this proof is the closest to that in the print run). Among other things information about the screen structure enables the printing expert to recognize changes to the tone value and the colour shifts associated with their or to see the effects of colour register deviations early on. Targeted access to the transfer characteristic curve can be made if necessary. The effects of halftone dot, screen angle, and screen frequency are reproduced in the screen proof and show the print quality of multicolour over printing.

Raster-dependent effects such as smoothness, grade and range of tonal gradations, and moiré or rosette patterns can be recognized prior to print production and if necessary be assessed together with the customer.

The use of postscript databases for screen proofs represents an inherent source of error. Since the dot structure is generally not yet a component of the PostScript file, the electronic dot generator in the post script interpreter of the proof device must create the same halftone dots as the RIP of the imaging unit for film or plate exposure. This means that the RIP of the film or plate image setter or of the computer to press system also controls the proof printer. Only in this way can identical dot shapes and screen angles be guaranteed.

Several vendors offer special proof systems for creating a "true proof" screen proof. The examples shown in work with the process colours C, M, Y, K. The proof is produced via colour donors and thermal transfer (ablation) onto intermediate carriers or onto the substrate used for print run. Both systems are image setter-like devices with which the image motif can be reproduced in every detail including their colour, screen definition and screen angles. The systems are designed for four A4+ pages. The units show in a multi-function system. It can be used to create screen proofs and for digital printing to image plates (computer to plate) when using the same RIP.

The true proof systems named use colour foils that are to be processed in separate units (laminators) transferred from intermediate carriers onto production paper and or laminated either to protect the proof or to give it the appearance of the surface structure of the production paper.

#### **Press Proof:**

A press proof is a text print of the data directly in a printing press. This can be the press for the production run or a comparable press (using the same print technology) prepared especially for proof purposes. Short runs of 50 or 100 copies can be produced more cost-effectively than with other colour proof process. The individual proof is however, hardly economically justifiable.

#### **Colour Management Concepts:**

The principal difference between a digital and analog proof lies in the need to use special paper (with ink jet or thermal sublimation) and in the colourants, which in many digital proof systems are either not at all or insufficiently adapted to the scales used in printing. Electronic printing and proofing systems with inks/colourants and substrates that have not been optimized must therefore be adapted as well as possible into the workflow.

Since the spectral characteristics of the colourants used and the reproduction characteristics of digital, non-impact based printing systems are generally not identical with those of the print process to be simulated, the reproduction characteristics of a printing press.

# **Summary:**

1)All aspects related to image assemble are clearly spelt out in this aspect

2)Signature of a book form important part of image assemble and to understand that a detailed explanation is given in this chapter.

3)Different parts of imposition scheme are listed and their meanings are clearly explained. An important aspect of inspecting film like small imperfection in type, bing hole etc, are mentioned and remedy suggested goldenrod paper method of working, peelable membrane. Complementing flats, double printing and surprinting are explained in detail equipment and tools are explained at length to understand the entire working of stripping section.

4)Proofing proves the success of stripping purpose of proofing hard proof, blue print and layout proof are explained in detail in this chapter. Colour proof, screen proof (time proof) and colour management concept also form an important point of this chapter.

## Short Answer Type Questions:

- 1) What is Signature?
- 2) What is Stripping?
- 3) Define Imposition?
- 4) Name important Imposition terms?
- 5) Write about Imposition Schemes?
- 6) Spell out the Imposition rules?
- 7) What is Goldenrod Paper?
- 8) Name the equipment used for film assembly department?
- 9) List out the tools used for Image Assembly?
- 10) What is Proofing?
- 11) What is Press Proof?
- 12) Explain Digital Proof?

# Long Answer Type Questions:

- 1) Explain the rules of Imposition?
- 2) How would you carry out Imposition of films?
- 3) Explain preparation of Imposition Schemes for 8 pages sheet and half sheet method?
- 4) Explain preparation of Imposition Schemes for 16 pages sheet and half sheet method?
- 5) Explain negative assemble on Goldenrod paper and method of working?
- 6) Write short note on a) Flap method b) Punched hole method
- 7) Explain about contact Frame mat?
- 8) Explain Digital Proofing?
- 9) Explain any two types of equipment and four kinds of tools used for film assembly?
- 10) What is Layout Proof and explain Screen Proof?

# PRINTING TECHNOLOGY

# Paper - II PRESS WORK & FINISHING - 1

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# UNIT 1

# **Printing Processes**

#### Structure

- 1.1 Introduction
- 1.2 Machine for Relief Printing Process
- 1.3 Press development in Letter Presses Printing Process
- 1.4 Platen Machine
- 1.5 Clamshell or Light Platen Machine
- 1.6 Improved Clamshell
- 1.7 Heavy or Parallel Approach Platen
- 1.8 Flat Bed Cylinder Machine
- 1.9 Rotary Presses
- 1.10 Roller Setting
- 1.11 Lithography
- 1.12 Flexography
- 1.13 Screen Printing

#### **Learning Objective**

After Completion of this Unit, the Student will be able:

- Give Brief Description of Letter Press Printing
- State the Purpose of Platen Machine.
- Explain the Classification of Platen Machine.
- Explain Cylinder Machine and its Classification.
- Explain Roller Setting.
- Explain Rotary Presses
- Give Brief Description of Offset Lithography, Flexography and Screen Printing Processes.

# **1.1 Introduction**

The Process of printing is a collective name for a wide variety of different industries, crafts which belong together because they all serve fundamentally similar and related purpose. The

#### PAPER II

printing industry as a whole though the process of reproduction is identical to each other can be divided into three main groups.

- 1) Letter Presses Printing (Relief Printing or Direct printing)
- 2) Lithography or offset (Planography printing)
- 3) Intaglio or Gravure printing (Sunken Process)



Each of this processes well suited for a specific Purpose because of the nature of the printing and taking the economical factors into consideration. Never less the reproduction has quality depended on many factors. Besides, these three main processes, there are other printing process (i.e.,) Flexography printing, Silk Screen printing and so on.

These major printing processes are further divided into different methods according to the machine, which were used right from the primitive stage.

# **1.2 Machine for Relief Printing Process**

Letterpress printing is the oldest and widely used among the printing process all over the world. Letter press is the direct printing process with equipment and images printed by the "relief" type printing plates where the image or printing areas are raised above the nonprinting areas. On application of ink, the relief areas are coated with a film of ink and the non-image areas are not. With pressure over the substrate to bring it in contact with the image area, the image is then transferred to the substrate.



Relief printing was the earliest form of printing and remained dominant for a very long time. The movable types of the hot metal era were all used with letterpress.

Text is made up of movable type. Types are made from an alloy of lead, antimony, and tin. In traditional letterpress work, letters were assembled into copy, explanatory cuts were placed nearby, line drawings were etched or engraved into plates, and all these were placed (composed) on a flat marble stone, within a rigid frame (chase) spaced artistically with blocks locked-up with

toothed angular blocks. A block is made of zinc or copper, in which images that are not obtainable in movable type are etched. Logos, diagrams, and illustrations are made from engraved blocks.

A letterpress printed product can be identified by the indentation that it creates in the paper. This is due to the mechanical pressure applied to the paper. In spite of this, letterpress produces images that are sharp and clean. It is a direct printing process, which means that ink is transferred directly from the printing surface to the substrate. Letterpress is still used to some extent for embossing, imprinting, and special-purpose reproduction.

### **1.3 Press development in Letter Press Printing Process**

The existence of this Letterpress printing process is declining in foreign countries as well as in India. This process in early stages was the only method of reproduction and the process has taken a number of developments from Eagle or Albino proof press to the present day fast moving rotary machines. Though the process was laborious and slow in comparison of present day speed, there was no other alternative. This process is known as Direct Printing Process since the stock on which the printing is to be done comes in contact directly with the matter from a unreadable stage. The credit of inventing this method of printing from movable types in Europe is attributed to "JOHAN GUTEN BERG" who has printed a book by this method in the year "1455".

The letterpress printing, which is considered as the oldest method of printing, can be classified into three different kinds.

1) Platen machine 2) Cylinder machine 3) Rotary Machine

The Platen is further classified as Light Platen or Clamshell, improved Clam Shell and Heavy Platen. Under the Cylinder Presses; the Classification is under Single Revolution, Stop Cylinder, Two Revolution, Rocking Cylinder, and Vertical Flat bed Cylinder.

The Rotary Presses are classified as Sheet-Fed & Web-Fed Rotaries.

# **1.4 Platen Machine**

Platen Machines are the advances in letterpress machine to that of Albion or eagle proof press of early stage. The platen machine consists of two sturdy frames called "platen" and "bed" besides inking rollers a fly wheel, a loose and fast pulley a lever to regulate impression mechanism and the treadle or paddle. The Platen can be divided into the following important points.



#### 1.4.1 Treadle

This is one of the parts of the platen machine with which the machine can be kept in running condition when the machine is not connected with motor. Regulating the paddle upwards and downwards can run the machine. The paddle is connected with crankshaft which makes the frame of the machine move close to one another.

#### 1.4.2 Fly Wheel

Fly wheel is generally provided to the left hand side of the operator to the machine. The flywheel shaft is connected to the motor with the help of the flat leather or canvas or rubber belt. The flywheel is provided to move the machine manually. The break is attached to the flywheel and the machine can be stopped by pressing the fly wheel with a flat belt provided at the foot of the machine. The fly wheel of the machine can also act as a courier balance of the machine.

#### 1.4.3 Lever

Lever is that part of the machine with the help of which the bed and platen can be brought to close contact by which the film of ink which has been applied by inking form roller can be transferred onto the printing stock. The lever regulates the impression nib or the transfer of the ink film from on (or) off position.

#### 1.4.4 Platen

Platen is provided at the machine where the paper is positioned for taking impression platen helps to register the image on the paper. A rough impression is obtained on the platen and the registration with regard to the margin (or) colour adjustment is done. The platen (or) treadle machine is covered with packing paper, which is fixed with the help of tympanum rods and clamps. The lays preferable three in number are arranged to the packing paper to print with required uniform margins or registrations.

#### **1.4.5 Impression Wedges**

The impression or pressure between the paper and forme can be decreased or increased with the help of these wedges, which are provided underneath the platen.

#### 1.4.6 Bed

It is that part of the machine where the matter is locked in a metal chase with the help of a hook.

#### 1.4.7 Roller Tracks

These are provided on both of a machine, which enable for smooth uniform up and down movement of the inking roller, the pressure between form rollers and mechanism provided can adjust the printing matter.

#### 1.4.8 Inking Form Roller

The form roller normally four in number are provided to apply ink to the matter during their up and down ward movement there form roller starts functioning their movement of the inking form roller is regulated with two strong side arms provided with spring which enable the form roller with constant contact either with the matter or with the ink disc. The form rollers are made with the roller composition (or) synthetic Rubber (or) Flexible plastic. The softness of the roller composition or synthetic rubber will be smooth so as to protect and prolong the Life of the matter intended for printing.

#### 1.4.9 Ink Disc

This is a platen flat circular shape metal provided at the top of the bed of a platen machine. The disc rotates according to the requirement of the operator in clock wise direction. The movement of disk can also be arrested if required by disengaging the gear hook provided at the bottom of the ink disc. The ink disc guarantees a uniform and thin film of ink by means of form rollers which come in contact at regular intervals with the ink disc.

#### 1.4.10 Ink Duct

It is a 'V shaped reservoir in which the ink stores for a long run jobs. The ink duct provides an uninterested uniform ink supply to the form rollers. The form rollers receives a thick band of ink film from the duct roller grinds uniformly with the help of a ink disc and finally supplies a uniform thick film of ink to the form to be printed. The ink supply from the ink duct can be regulated with the series of set screws provided at the back of ink. The circular movement of an ink duct roller can be increased or decreased for an overall ink supply.

#### 1.4.11 Loose and Fast Pulley

The platen machine is provided with a fast loose pulley with the help of with the belt connected to the motor can be shifted either to fast or loose pulley if the belt is shifted to the loose pulley.

It will help the operation to stop the machine for temporary adjustments and keeps the motor in running condition. Again if the operator wishes to run the machine by power he can shift the belt with the help of a lever which will engage the shaft of the machine with the motor.

The simplest form of letterpress machine was carried by platen machine in olden days. The platen which carries the stop can be printed and comes in contact from the horizontal position to the vertical position and take the impression through pressure from the form onto the bed. The platen machine can be classified into two main groups.

1) ClamShell or light platen 2) The Heavy or parallel approach platen

The ClamShell group of the platen machine can be further divided into two kinds.

1) Clamshell 2) Improved clamshell platen machine

# **1.5 ClamShell or Light Platen Machine**

The clamshell or light platen press is so called because the shape of the bed the platen when it comes in contact for printing it looks like a shell. The construction of light platen machine is best suitable for a wide variety of small jobs like Visiting cards, Greeting cards, Leaflets, Forms jobs of small quantity often with large area of type.

The impression is uneven excessive make-ready is necessary. When attempting to print jobs outside the limits of machine extra packing has to be carried often-causing complication either to the machine or to the print.

The bed as well as the platen moves along with their arms and takes the print at an angle since the bed and platen are made to move for taking the impression because of which much strain is experienced on both the frames of bed and platen which resulted in switching on to an invention in the shape of improved clamshell.

### **1.6 Improved Clamshell**

The improved clamshell is identical in construction to that of clamshell or light platen machine. The bed of this type of platen machine which carries the paper is alone made to move from and horizontal position to a vertical position for obtaining the print. The construction of the machine is also strong to that of light platen machine. The improved clamshell platen machine is provided with an extra arrangement of ink plate underneath the bed or form for extra grinding of the ink. The ink rollers after applying ink to the form still move towards the bottom of the bed where the ink plate is fixed for additional grinding for uniform film of ink supply to the form. Because of this modifications and additional arrangements to this machine it is called the improved clamshell platen machine.

### **1.7 Heavy or Parallel Approach Platen**

These machines are heavily constructed and will cover a wide range of work because of sturdy construction, heavy type and block forms in monochrome (or) process colour can be adopted for cutting, creasing and embossing. As the need of the hour, automatic feeders are introduced and attached to the platen machine to meet the speed of the working skill and as well as perfection. The inking system for this heavy platen machine is also modified from that of the ink disc system to premedical or drum inking system where perfect grinding as well as uniform ink film is achieved.

# **1.8 Flat Bed Cylinder Machine**

As the day passed the importance of printing was felt and more and more work to the industry to meet the requirements of the needs, the process was made faster and the invention the flat bed cylinder machines most one of the factors in the modernization of the machines. The paper is placed on the feed board at the top of the press and one sheet at a time is removed to the adjustable feed guides, which rests on metal strips at the lower edge of the board directly over the cylinder.

The bed of the press containing the flat forme moves back and forth on its track beneath the cylinder and ink rollers for each impression. Cylinder press holds the type forme on large flat bed, which moves backwards, and forwards upon the track beneath the impression cylinder. Sheet

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of paper fed at the top or carried around the cylinder, the paper receives the impression or print. Only small segment of the cylinder comes in contact with the type matter or forme printing is done step by step unlike platen machines. The shape instead of grinding the paper flatly, a cylinder was provided. The cylinder rotates on a flat matter along with the paper which enables to get an impression on to the paper these machines were much useful to the industry where catering to the need of the process at a comparatively faster rate. Further developments still made these machines into five categories as mentioned below.

1) Stop cylinder machine (or) Drum cylinder

- 2) Single revolution machine
- 3) Two revolution machine
- 4) Rocking cylinder machine
- 5) Vertical cylinder machine

#### 1.8.1 Stop Cylinder Machine or Drum Cylinder Machine

In this method the cylinder intoned for supporting the paper while taking impression stops after every print so as to allow the bed to return to its correct position to commence the printing for the subsequent sheets. During the time the bed is returning from inking the cylinder is being guided by a pusher bar to a stop to ensure that it is in correct relation with the bed.

The paper is placed on the feed board at the top of the press and one sheet at a time is moved to the adjustable feed guide, which rests on metal strip at the lower edge of the bed directly over the cylinder.

The bed of the press containing the platform moves back and forth of the track beneath the cylinder ink rollers applies the ink to the form for each impression. The back and forth movement of the bed is obtained by the means of a crank which is connected to the inner side of the rims of two large driving wheels. At each end of the movement there is a natural slow down stops the crank pass over dead center.

This crank action gives a fast and smooth bed motion. The paper is fed to the gripper at the lower edge of the cylinder with the side to the printed face downwards impression is taken during the travel of the form the feed to the duct end of the machine during the return movement of the bed the cylinder remains stationary and the sheet is delivered with printed side up. The significant print to note in this type of machine is that circumference of the cylinder is equal to the length of the bed.

The pressure between the cylinder surface and the form is being maintained by means of bearer at both ends of the cylinder which runs in contact with bearers of the bed. The manufacturer presets the pressure between the cylinders and the bed. The wharf dale machine is constructed with this principle.

#### **1.8.2 Single Revolution Machine**

The main feature of this machine is that the cylinder makes one revolution for each print where as the bed makes two strokes for each copy to print. The cylinder of these machines has a cut out portion, which enables the bed to return its backward journey for inking successive printing. Bed portion of these kinds of machines is so adjusted when the cut portion of the cylinder faces downwards. The advantage of this machine is space saving since the feeding and delivery are made from the same side of the machine. Since the feeding and delivery are so
designed from the same side of the machine, the amount of stock that are to be printed cannot be loaded as the space left out is very merger which results in disadvantages.

#### **1.8.3 Two Revolution Machine**

The machine of this principle is very popular in letterpress printing industry. In this method, the impression cylinder revolves continuously making two revolutions for each impression taken. The cylinder is caused to rise and fall on alternate revolutions is kept in a raised position for running the machine when no print is required. The feed board is located at the top of the cylinder and the sheet into the gripper face up. Printing occurs during the revolution when the cylinder is in the lowest position and the bed is travelling from ink duct and to feed end of the machine. Delivery of the printed page takes place during the second revolution when cylinder has risen into two movements to the top portion to clear the form and the bed is returning for the next printing cycle. The cylinder bearers run in conjunction with bed bearer maintaining the cylinder are locking clamps for securing the packing; grippers for holding the sheet during printing and shoe fly fingers for lifting the edge of sheet prior to delivery. The recess for packing on the face of the cylinder allows for correct dressing and the depth varies between different makes of machines.

Attached to the cylinder is register segment gear, which engages with register rack, attached to the bed. This ensures that the cylinder is in register with the bed at commencement of the impression. It is essential that the setting is correct and no adjustment should be made unless the operator is fully competent to carry it out. The principle involved in bed reversal of the different types of two revolutions presses varies considerably in their mechanical action. The Michel two revolution presses employs a drive for bed reversal by the use of sliding gear, termed as bed motion gear which engages alternatively into staggered racks fastened under the machine, bed one above and one below the gear. A crank device is used for the reversal while the gear is sliding over and it is this crank, while slows up, stops and reverse the bed.

The movement of the bed is very great and air buffers are employed at each end of the travel to make the impact of reversal and help to obviate the strain. These buffers enter cushion heads attached to the main frame so that the air compressed resulting in a very reversal action. The ink system on two-revolution press is efficient for a wide range of work and will give excellent result on small type area is large solids. The ink from the precision controlled duct is fed into the ink slab by a duct roller, it is then broken up by disturbing rollers which are assisted by gear driven steel rider rollers. Inking of forme is achieved by a paramedical arrangement of composition rollers and steel vibrations giving the full coverage of the forme. The most popular type of machine in this group is Michel two-revolution press.

#### 1.8.4 Flat Bed Rocking Cylinder

These machines are also built with a bed and a cylinder which carries the paper to support while printing. The bed moves to and fro like other flat bed cylinder presses. The significant role of the cylinder in this type of the machine is that the cylinder makes one clock-wise and one anti clock-wise revolution for each impression unlike other flat bed cylinder presses. In the usual printing stroke the bed along with the cylinder, revolves in contact enabling the paper to get an impression. Soon after the completion of one revolution, the bed starts its reverse movement and the cylinder also revolves in the opposite direction. The mechanism is so adjusted that the cylinder goes out of contact with the bed during its reverse motion. The printed paper is delivered to whatever mechanism provided during its reversal revolution of the cylinder. The inking system provided to this type of machine is pyramidical inking system. It guarantees a fine film of ink because of which fine halftone and good quality work can be executed in these machines.

The delivery process in these machines are quite long and due to this reason the printed paper gets a lot of time for dying and the danger of set-off is avoided considerably. Although these machines are built with simple mechanism the sheet controls such shoe-fly, sheet-band, cylinder brush, cylinder grippers, and front lays create lot of troubles during working of the machines. These machines can be run with a maximum speed of 5000 impressions per hour. Victoria front machines are based on this swing cylinder mechanism.

#### **1.8.5 Vertical Flat Bed Cylinder**

These types of machines are based on the principle of stop cylinder machine with a basic difference of vertical movement of the bed instead of horizontal motion. The features of this machine allow for a fast rate of running with an easy access to the bed, cylinder and inking units while requiring a minimum floor space. The main principle with which the machines are constructed is that the type bed and the impression cylinder reciprocate in opposite direction on the vertical plane. They are driven by a simple crank mechanism and counter-balance each other to give a smooth, vibration-free motion. When a sheet of the paper is fed into the machine, the cylinder is caused to revolve by the automatic action of diaphragm which provides a positive engagement of the driving mechanism. Impression is obtained on the paper as the cylinder moves upward against the face of the forme travelling downwards. At the top of its travel, the cylinder releases the paper to delivery grippers and return to the lower position without revolving.

Inking rollers are suited beneath the cylinder to ink the forme in both the directions. The supply of ink is from a duct and is transferred by means of a duct roller to a small slab attached to the base of a moving bed. A thin film of ink is supplied with the help of two composition rollers and one steel rider. To allow for easy wash-up, the rollers can be dropped down and the duct swing out of position. Sheets are automatically fed to a suction feeder to a feed board located at the top of a cylinder. The feeder can be disconnected to a impress to the machine and the cylinder can be turned by hand for make-ready. The grippers attached to the cylinder are not adjustable. The forme can be raised or lowered by means of supporting screws at each end of the bottom comers of the bed. A set of pulleys which are easily transferable gives the machine a well controlled range of printing speed. There are two machines in vertical job press group namely 1) Micelle and 2) Homes vertical press.

#### **1.9 Rotary Presses**

Rotary presses are a step further to that of flat bed cylinder press. This is an improvement of letterpress machines. The invention of rotary machine is mainly attempted keeping in view the speed of the process and printing needs.

The works which the rotary press engages are newspapers, magazines, catalogues and much work requiring long runs. Impressions are obtained between two cylinders which are made to roll together in contact while printing. All rotary presses are built with two cylinders. One holds the curved plate of the matter and the other carries the paper and acts as an impression cylinder while taking impression. Type forme for flat nature cannot be used in this type of presses. The image carrier of rotary letterpress machines are either curved duplicate plates mainly electrotype or photo mechanically made thin curvable image carriers including metal wraparound plates, direct photo photopolymer plate and Kodak relief plates.

Rotary presses are built for high speed requiring long runs like newspapers, magazines, catalogues etc. impressions are taken between two cylinders which roll together, and one holds

the curved printing plate (duplicate plate) of the matter on which the impression is to be taken. The paper passes around the cylinder and comes in contact with automatically inked plates. Stereo type plates are made from type pages but for magazine works and book works, electrotype duplicate plates are used. The plates are curved to fit the plate cylinder. The type of ink which is used on rotary letter press machines vary in consistency when compared to that ink used on plate machines or flat bed machines. Generally delivery systems are automatic to meet the speed of the machine. Various automatic adjustments with regard to the impression, registration, and ink supply are provided on these machines.

Rotary letterpress machines can be single web, double web, multi web fed machines. Rotary presses can be based on two different construction principle one being unit type design in which every work is printed by an individual printing unit consisting of a plate cylinder and an impression cylinder. The other construction principle is that a common impression cylinder for two or more units. Sheet fed rotary presses of letter presses are usually designed for printing one side of the paper where as reel fed presses are usually perfecting which prints on both sides of sheets simultaneously in one pass through the presses. Rotary machines of letter press with one unit type are made in 1, 2, 3, 4, 5 and 6 colours for one side printing. Rotary machines of present day are manufactured with number facilities where the web of paper after printing in more than one colour or both sides can be folded, gathered with the cover, stitches, cut and delivered in the book form duly counted with kicker mechanism which can be adjusted from 50 number onwards.

## 1.10 Roller Setting

The function of rollers in the printing machines has a very important role. It is essential that rollers of good quality should be used in every printing machine for high quality printing. The function of roller in the printing machine is to grind the ink properly and apply it evenly on the printing surface.

The roller should not be set with heavy pressure with the riders and steel drums. Due to this, the composition rollers get heated soon and becomes soft, thus they might melt and becomes soft. Thus they might melt and become defective or less durable. Before placing the rollers in its brackets, a strip of paper should be inserted between the distribution roller and the rider. Then the strip is pulled out slowly for checking the correct contact with each other. The strip should be pulled and it should neither come out loose nor should it be too tight. The ink of the rollers should be cleaned immediately after work is over, otherwise the ink dries up on it.

Special attention should be given to the rollers, when printing has to be done with metallic inks, such as golden and silver inks. These inks dry-up on the rollers very quickly and the rollers become useless. No other liquids should be used for cleaning the rollers, except kerosene oil or paraffin oil. Otherwise good qualities of the rollers are lost and the roller becomes useless. Many difficulties in printing can be reduced, if the temperature of the machine room is maintained from 25<sup>o</sup>F and the relative humidity from 50 to 60%. The rollers should not be left in contact on the machine. Otherwise due to mutual pressing among the rollers makes a long flat mark.

After the printing work is over, it is essential that the roller should be removed from the machine by keeping the following points in mind.

## 1.11 Lithography / Offset Printing

The lithographic process was invented by Alloys Senefelder in the year 1798. The plan graphic printing can be classified as Lithography, Offset lithography. Further it can be classified under Sheeted and Wed fed offset lithography.

Then we have the perfecting machines in the offset lithography process wherein in both sides of a stock can be printed simultaneously.

#### 1.11.1 Lithography

Lithography was invented by a Bavarian Alloys Senefelder in the year 1786. He wrote a laundry list on a freshly polished stone for his mother using a greasy crayon. Being curious he experimented with the stone and found that when chemically treated and inked, impression could be pulled from the stone, thus paving way for the birth of Lithography and shares the maximum responsibility of inventing and developing the new process of printing called lithography. Alloys Senefelder was born in the year 1771 at Prague. His father was German actor, belonging to Austria. Senefelder was given good education at Munich. In 1799 Max Joseph gave an exclusive privilege lasting for 15 years for the exploitation of his invention. In 1809 Senefelder was appointed as Royal inspector of Lithographic Institute.

Life of Senefelder was devoted to lithography and in the year 1817, he submitted a model of Lithographic press with automatic inking and dampening which earned him a Gold Medal in recognition of his invention. At the same time he invented the first paper plates with which he could replace to have Lithographic stone. After hectic inventing and developing this new trade for about 63 years, Alloys Senefielder breathes his last in the year 1834.

In the span of five decades in the process many changes had taken place from hand operated machines to mechanization. In 1875 Robert Barclay patented the first offset machine with two cylinders, one having a prepared card on which the printing has to be taken from the stone and the other one being impression cylinder. A thin sheet is fed in between the cylinders and thereby transferring the image on to the paper directly.

The evolution started with the cylinder used in the place of a limestone later on introduced another cylinder covered with rubber blanket by offsetting the image onto the paper and the paper is supported by another cylinder while transferring the image called the impression cylinder. The flat bed motion has been replaced with rotary motion. After these developments, the automatic feeders have come into existence and later on two colour and multi-colour machines have also captured the present market. Web fed machines have also replaced sheetfed machines with additional gadgets like perfecting, numbering, folding and counting etc.

#### 1.11.2 Offset Lithography

The basic principle on which it works is that oil and water do not mix. A litho printing plate has non-image areas which absorb water. During printing the plate is kept wet so that the ink, which is inherently greasy, is rejected by the wet areas and adheres to the image areas.



A lithographic plate is treated in such a way that the image areas on the plate are sensitized and as such are oil-loving area; and the non-image areas are treated to be ink repelling. During the press run, the plate is charged twice; first by a set of dampening rollers that apply a coat of dampening solution and second by a coat of the inking rollers. During this process the image areas have been charged to accept ink and repel water during the dampening. The same happens to the non-image areas that start repelling ink as they are coated with water.

It is an indirect printing process. In direct printing method, the printing image carrier is inked and the resultant inked image is directly transferred to the printing stock where it becomes the printed image. In offset lithography the ink is not transferred to the stock directly but applied to an intermediate surface called the blanket. From the blanket the image is then transferred again now to the stock where it becomes the final printed image.

Therefore offset presses need three cylinders for the printing units. The three cylinders are

- 1. Plate cylinder which carries the printing image,
- 2. Blanket cylinder which carries the blanket and
- 3. Impression cylinder or paper cylinder where the printing stock is positional.



During each revolution ink supplied to the plate cylinder which is being transferred to the blanket cylinder and in turn transferred on to the stock which is rightly backed by the impression

cylinder, offset lithography presses are best divided into two broad groups such as 1) Sheet fed and 2) Web fed or reel fed.

Sheet fed offset lithography press: The plan graphic printing can be divided into two methods where the paper can either be fed in the form of a roll or web and in the form of a cut sheet. The printing method remains identical in both methods. The second form of this method is called as sheet fed offset Lithography. The offset machines in general are provided with a plate cylinder, a blanket cylinder and an impression cylinder. During each revolution of the press a calibrated amount of ink layer is supplied to the image area of the machine and the same amount of ink layer gets transferred to the stock from an intermediate cylinder which carries the blanket. The sheet fed offset lithography machines are provided with a feeder, dampening unit, inking unit, registration controls and finally with a delivery mechanism.

Single Colour Sheet fed Offset Machines: Single colour sheet fed offset machines are the most popular in the offset printing field. Offset machines of sheet fed model are available in different sizes. The smallest size of machine available is foolscap folio  $(8\frac{1}{2} \times 13\frac{1}{2})$  and the maximum size is up to quad super  $(54\frac{1}{2} \times 77^{"})$ . The speed of the machine varies according to the size and the manufacturer's mode of construction. Irrespective of the size and speed, all single colour sheetfed offset machines are made to print one colour at a time. Every offset machine will have feeder, forwarding unit, printing unit, dampening and inking systems and delivery mechanism. The design of the machine will vary fron manufacturer to manufacturer keeping the necessities. The mechanism also varies according to the size and speed of the machine.

**Multicolour Sheet Fed Presses:** Multicolour sheefted offset machines consists minimum of four printing units where four colours can be printed simultaneously one after the other colour. The number of available models and size are comparatively less to that of the single colour offset machines. The construction of multicolour sheetfed offset machines are identical in plate and blanket cylinder but some manufacturers may have a common impression cylinder in between two printing units which helps in reducing the cost of the machine. Some manufacturers have also designed these multicolour machines in such a way that the paper can be printed on the reverse side with the help of a transfer drum.

## **1.12 Flexography Printing**

Flexographic printing process has been in use under the name aniline printing ever since 1890. Water soluble inks were used in this process. Aniline printing machine were used only for the printing of paper bags. Printing plates made of ordinary rubber and specially made inks were used after some time. The process was named flexography in the year 1952 and since then various developments have been introduced from time to time.



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The work flexography is derived from flexible+graphy and literally means printing from a flexible surface. This name is quite apt due to the use of flexible rubber or other printing plates. The printing plates used in this process are prepared by duplicating principle. Now-a-days polymer and nyloprint plates are being prepared by using negatives. The method of it is somewhat similar to the preparation of surface plates of litho-offset.

Due to the relief image surface of the flexographic printing plates, this process may be said as a modern development of letterpress printing. The image surface of the flexographic plate remains in relief and the non-image surface in depth. The ink is applied on the relief image surface and transferred on the paper or other substrate.

Generally a web of paper is printed by flexographic printing machines similar to the letterpress and offset web machines. The main difference is there in the quality of inks and its arrangements. These machines are being manufactured in India as well as in foreign countries. Not much complicated mechanism is involved in the manufacture of these machines.

Flexographic printing machine do not have many design similar to the letterpress and offset machines. These machines are mainly used for the printing of packaging materials which only one side of the papers is printed. Therefore flexographic printing machines have been designed according to the size and requirements of the packaging jobs, though some of the printers in India and abroad are printing books on these machines after some change in the properties of inks. Some are also printing newspapers by hiring these machines say for two hours daily.

Most packaging materials are printed in multicolours to attract the buyer. Printing on polythene and plastic surface is also done very successfully by this process. Accordingly, these machines are made in one to four units. Each unit has one plate cylinder, one ink fountain, one or two distributors and one impression cylinder. Each unit is used for printing one colour.

#### **Characteristic points**

The flexographic presses can be described with regard to the item specified below:

- 1. Type of presses
- 2. Number of colours that can be printed in one passes through the press
- 3. Maximum width of the web
- 4. Maximum length of repeat
- 5. Kinds of stocks that can be printed by the press
- 6. Kinds of feeding equipment provided
- 7. Kinds of operations to which the printed web must be subjected at the delivery end
- 8. Maximum speed at which a given press can be operated
- 9. Drying and cooling equipment employed
- 10. Various means for controlling the tension and registration of printing web.

#### **Type of Presses**

Flexographic presses can be broadly classified into three categories

- (a) Stack type
- (b) Central or common impression drums type
- (c) Inline presses

(a) Stack Type: In stack type presses two or more printing and inking units are vertically arranged on one or both ends of the main press structure. The main drive frame usually contains one common bull gear that drives into colour sections through separate gear trains. Four colour stacks are most common but presses can be built from one printing and inking units to eight or more.

(b) Common Impression Type: The principle of common impression cylinder type is quite similar to those used in letter press and in offset. Several image carrier cylinders from two and more are combined with a common impression cylinder which can also be called as a drum. The central cylinder may be as large as five or six feet in diameter. This type of machines are very ideal for thin stocks, cloth, paper without much body or a material that wrinkles or stretches easily because such materials cannot be webbed over long distance without re-enforcement. The drum cylinder presses will give better register than the stack type presses. But there are more difficulties in drying of inks between the units when overprinting is necessary. There is also little possibility to control the position of the web in sideways motion. Perfection on drum type presses is not possible. A more common method is to connect either a stack type press or another central impression drum press inline for perfecting the web.

(c) Inline Presses: Inline presses are also known as unit type presses. Each unit of this press consists of an image carrier cylinder, an impression cylinder and unit follows unit on the same level. The number of units depends on the purpose of press. The web presses from one colour unit to another colour unit are in a straight line. Perfecting can be accomplished in this type of presses. The term inline is used in second sense throughout the converting industry. Inline flexographic manufactures attach more or less finished end products and does printing as well as the required converting operations. Among inline presses are that produce paper bags, envelopes, die-cuts and sometimes window papers, folding boxes, paper napkins and so on.

**Number of colours and width of web:** Flexographic presses are built to cater the needs to the extent of one to six colours. Till recently these machines were imported and now indigenously manufactured machines are also available. Stack type press have frequently two, four or six printing units. Central impression cylinder presses are also made in the range of colour units. The maximum width varies between 4½ for labels and 95" for the printing on paper. Within this range one can find 18", 24", 28", 36", 38", 40", 44", 48", 52", 55", and 60" models.

Length of Repeat: In flexography, the term repeat is defined as the printing length of a plate cylinder gear. Narrower presses have usually shorter repeat than wide ones. Most flexographic presses are built to permit changes in repeats. A very frequently listed range of repeats is from a minimum of 9" and to a maximum of 36". Changes in length of repeat can be either of the fixed increment type or all size repeats. The fixed increment type depends on the number of teeth in the gear of the impression cylinder. All size repeats can vary without limitation within the range of the press. Changes in repeat are accomplished by means of various mechanical adjustments rather than by changing gears.

**Speed of the flexographic press:** The speed of a flexographic press is expressed in terms of feet per minute. Unlike other web presses or sheet fed presses as impressions per hour. Flexographic presses at present are built for speeds of 1000 feet per minute. Machines which are manufactured with latest technology can run faster. The maximum speed of a press must of course not be confused with the actual speed which a specific job is run.

**Feeding and delivery equipment:** Flexographic machines can hardly be seen but most of them are roll fed. Roll fed machines can hold one or several rolls of stock. The expiring roll can be connected to a new roll in various ways. The printed web of stock can be either sheeted or rewound into a roll or completely converted into final product such as paper bags. Some inline presses have coating and laminating equipment and then may be connected to die cutting and stripping machines.

**Kinds of stocks for flexographic presses:** Majority of the flexographic machines are engaged in printing on flexible material like polythene, polypropylene, plastic films, foils, glassine (a kind of transparent paper), wax coated papers and paperboards. Some presses are built for particular stocks such as paper of paper of lightweight boards or films and some presses can handle all of these materials.

**Drying, cooling and web control equipment:** Drying of printed image (ink) particularly on flexographic machine requires special attention since the printing is done on a non-absorbent surface. High speed web printing in several colours requires equipments for forced drying. Such equipment must be supplemented by a cooling or chilling unit particularly of the printed web is to be rewound. The web of material must be carefully controlled it is tension and in its portion across the press.

**Swing out features:** Swing out features in flexographic press is interesting and found particular in stack type presses. The plate cylinder is divided into two units in its width. The same is done even with ink fountain and with an intermediate roller. The impression cylinder is of course full and not divided. This construction makes is possible to keep one part of the divided rollers running and to swing the other part for preparing the changeover from one set of plates to the next.

The swing out feature is mainly used for printing of milk containers which though manufactured in huge total quantities may nevertheless be produced in relatively small individual orders. Orders which require changes of plates for different viands are usually planned for printing on the same stock and for taking advantage of the swing out features. The width of the stock is half or less when one set of plate is running. The swing out features makes it possible to prepare the press for the change in brand. As this preparation takes place without stopping the press, a swing out feature is an important economy factor. Even though swing out can be built for other than stack type presses and for all size repeats they are mainly used on stack type press with fixed increment repeats.

## **1.13 Screen Printing**

Screen printing is arguably the most versatile of all printing processes. It can be used to print on a wide variety of substrates, including paper, paperboard, plastics, glass, metals, fabrics, and many other materials, including paper, plastics, glass, metals, nylon and cotton. Some common products from the screen printing industry include posters, labels, all types of textiles and electronic circuit boards. The advantage of screen printing over other print processes is that the press can print on substrates of any shape, thickness and size.

A significant characteristic of screen printing is that a greater thickness of the ink can be applied to the substrate than is possible with other printing techniques. This allows for some very interesting effects that are not possible using other printing methods. Because of the simplicity of the application process, a wider range of inks and dyes are available for use in screen printing than for use in any other printing process.

**Screen Printing process:** Screen Printing consists of three elements: The screen – which is the image carrier, the Squeegee and the Ink. The Screen Printing process uses a porous mesh stretched tightly over a frame made of wood or metal. Proper tension is essential to accurate colour Registration. The mesh is made of porous fabric or stainless steel mesh. A stencil is produced on the screen either manually or photo chemically. The stencil defines the image to be printed in other printing technologies this would be referred to as the image plate.

Screen Printing ink is applied to the substrate by placing the Screen over the material. Ink with a plain-like consistency is placed onto the top of the screen. Ink is then forced through the fine mesh openings using a squeegee that is drawn across the screen, applying pressure thereby forcing the ink through the open areas of the screen. In will pass through only in areas where no stencil is applied, thus forming an image on the printing substrate.



**Screen Printing Presses:** Screen Printing Presses can be classified into three types : (a) The flat-bed (b) Cylinder and (c) Rotary.

Utilization of screen printing presses has begun to increase because production rates have improved. This has been a result of the development of the automated and rotary Screen Printing press, improved dryers, and U.V. curable inks. The major chemicals used include screen emulsions, inks, and solvents, surfactants, caustics and oxidizers used in screen printing process.

**Jobs suitability:** Many diverse industries make use of screen printing such as Printed electronics, including circuit board printing, thick film technology, Clothing, Balloons, Medical devices, Snowboard graphics. Some of the printing applications include Signs and displays, Textile fabric, Product labels, ceramics, metal, wood, paper, glass, and plastic.

## **Summary**

- Letter press is the oldest method of printing with equipment and images printed by the "relief" type printing plates where the image or printing areas are raised above the non-printing areas.
- The machines that come under letter process printing are Platen, Cylinder and Rotary presses. Platen can be classified as like platen, improved platen and heavy platen.
- Cylinder machines can be classified as Stop Cylinder machines, Single revolution, Two revolution, Rocking cylinder and Vertical cylinder machines.
- Rotary presses can be single web, double web, multi web fed machines.
- The function of printing rollers has a very important role. Paper care and maintenance of the printing roller is very important.
- Lithography, Flexography and Screen Printing are the other printing processes which are also popular.

## **Short Answer Type Questions**

- 1. State the principle of Platen machines?
- 2. Bring out any three differences between Light Platen and Heavy Platen?
- 3. Classify cylinder presses?
- 4. List out any five parts of a Platen machine?
- 5. State the principle of Single Revolution machine?
- 6. Mention the principle of Stop Cylinder presses?
- 7. State the principle of Two Revolution presses?
- 8. What is Rotary press?
- 9. Briefly mention about Lithography?
- 10. What is Offset Lithography?
- 11. State the principle of Flexography?
- 12. What is Length of repeat?
- 13. What is Screen Printing?
- 14. Mention the job suitability of Screen Printing?

## Long Answer Type Questions

- 1. Classify letterpress machines and mention the principles about each one of them?
- 2. What do you know about Lithography? Explain the machines that come under them and how it works?
- 3. Explain the different types of flexographic printing machines and how do they function?
- 4. How is roller setting carried out on a printing machine? Explain.
- 5. Compare and contrast between letterpress and lithography?
- 6. Explain Screen Printing and Screen Printing process in detail.

# unit 2

## **Offset Press Operations**

## Structure

- 2.1. Basic Principles of Offset Printing
- 2.2 Construction / Structure of a Sheet Fed Press
- 2.3 Inking System
- 2.4 Dampening System Construction of Conventional
- 2.5 Delivery System
- 2.6 Types of Sheet Transfer Chain Transfer, Single Drum and Three Drum Systems
- 2.7 Materials used in Offset Printing
- 2.8 Wed Offset Presses Single and Multicolour Web Offset Presses
- 2.9 Various Press Configuration Learning

## **Learning Objective**

After Completion of this Unit, the Student Will be able to:

- To know the basic principles of offset printing
- To know about construction / structure of a sheet fed press
- To know feeder system, transfer and registration system
- To know dampening, inking and delivery system
- To know about plate cylinder, blanket cylinder used in offset press
- To know about inking system in offset press
- To know about parts of the inking system
- To know about printing rollers
- To know about dampening system, solutions
- To know roller settings, feeding and delivery system
- To know about plates and inks used in offset presses
- To know single colour and multi-colour Web offset presses

## 2.1. Basic Principles of Offset Printing

The process of lithography was originally confined to stone slabs which were prepared for printing with the use of greasy drawing inks and crayons to form an image on the flat surface of the stone, and various chemicals applied to ensure that when inked the non-image areas of the stone remained free from ink. Zinc plates were introduced by about 1820 to replace the cumbersome stone and by 1860 a photographic process was being used to form an image on the plate instead of hand drawing. The use of zinc plate permitted the development of rotary presses and at the turn of the 20th century an American developed a paper printing press with a rubber covered cylinder between the plate and impression cylinders of the conventional direct press. Thus offset lithography became the predominant method of printing from litho plates.

The principle of offset exploits the phenomenon that grease repels water. An ink attracting, water repelling image is formed on the modern aluminium plate by photographic means. The nonimage areas of the plate are rendered water-receptive by coating the plate with a solution of gum Arabic (or Substitute gum). When processed, the plate is fitted to the cylinder of the offset press where it is damped by cloth rollers and then inked by rubber rollers.

The inked image is then transferred by contact pressure to rubber covered cylinder (blanket cylinder) which in turn impresses the image onto paper which is pressed into close contact with the blanket by an impression cylinder. The image is thus offset from the plate to the paper. The use of this soft rubber covering on the offset cylinder allows a variety of coarse surfaced papers to be printed by this process with success. Most of the aluminum plates used today carries a tough coating of aluminium oxide (anodized) on the surface which gives the plate good water carrying properties together with corrosion resistance.

The non-image areas of the plate are treated with Gum Arabic to make them water receptive. Fountain solution additives such as gum Arabic or alcohol are added for the efficient working of the image. In addition to the use of chemicals in fountain solution, the press man will often use an acid based solution called 'plate etch' for cleaning the non-image parts of the plate. Plate etch is necessary for removing ink which has become attached to the non-image areas of the plate. Its action is designed to make the plate surface clean and to give the desensitizing properties of the Gum Arabic its full effect.

#### Offset printing process consists of several parts:

- (a) The inking system (ink fountain and ink rollers);
- (b) The dampening system (water fountain and water rollers);
- (c) The plate cylinder;
- (d) The offset cylinder (or blanket cylinder);
- (e) The impression cylinder.

#### In this process, ink is transferred from the ink fountain to the paper in several steps:

- 1. The inking and dampening systems deliver ink and water onto the offset plate covering the plate cylinder.
- 2. The plate cylinder transfers the ink onto the blanket covering the offset cylinder.
- 3. The paper is then pressed against the offset cylinder by the impression cylinder, transferring the ink onto the paper to form the printed image.



## 2.2. Construction / Structure of a Sheet Fed Press

The sheet-fed offset press is a generalized machine designed for a wide variety of work. As larger sheet sizes and more colours are run, these presses become longer and more complicated. The sheet fed offset press is made up of a series of systems each functioning as part of the total printing process. These systems are, each functioning as part of the total printing process. These systems are, each functioning as part of the total printing process. These systems are named by their function: feeder, transfer, and registration, inking, dampening, printing and delivery. Each of these systems must be set up, or "made ready" before printing can begin.



## **The Feeder System**

The function of the feeder is to separate one sheet from the pile and move it to the transfer and registration system. There are two general types of feeders, the single sheet feeder and the stream feeder.

## **Transfer and Registration System**

The transfer and registration system carries the sheet from the feed pile to the impression cylinder grippers in exact position for printing. The sheet is forwarded from the feed pile to pull-in wheels at the rear of the transfer table. Moving tapes on the table carry the sheet to the front guides. The sheet is stopped by the head stops and pushed pulled sideways into position with the side guide. Various detectors may be installed to sport double fed, torn or cocked sheets.

The feeder, transfer and registration systems are timed to the press cylinders in order that each sheet will be in position as the impression cylinder grippers rotate past the guides on the feed table.

## The Dampening System

The dampening system is designed to provide moisture to the plate. It also provides chemical protection to the back ground (non image area) of the plate preserve its water receptive properties. The conventional dampening system consists of a water fountain pan, doctor roller, a vibrator roller and form rollers.

#### **The Inking System**

The inking system is designed to transfer ink from the storage through a series of rollers to from a thin even film on the image area of the plate.

#### **The Delivery System**

The delivery system is used to remove the sheet from the impression cylinder to a storage location for the printed sheets. The delivery cylinder is a reel made up of spider wheels it is used to support the sheet and drive the chains of the transport system. The transport system has delivery gripper bars between the chains timed to transfer the sheet from the impression cylinder to the delivery grippers on the delivery gripper bars.

#### **Printing unit**

#### (a) Plate Cylinder

This cylinder is of robust construction with a depression gap which houses the plate clamps for secure plate fixing. Smooth rotation of the cylinder, like the other two cylinders, is achieved with a balancing weight located in the depression gap.



The depression gap occupies approximately one-quarter to one-half of the cylinder circumference. During the printing cycle the depression gap permits time between each sheet as it passes through the unit for the following sheet to be registered at the front lay and side lay. The wider depression gap, therefore, the greater the time allowed for sheet positioning at the register lays.

The bevel edge of the depression gap which carries the leading plate is arranged to coincide slightly in advance of the blanket depression gap leading edge. This gives a maximum printing area on the plate and also prevents the build up to ink on the leading edge of the plate transferring to the blanket.

Three principal types of plate clamping mechanism are used:

- 1. The plate is pinched securely between two bars running the width of the cylinder. The bars are tightened by adjusting a number of bolts set into the bars at intervals. The bolts are normally tightened by a socket wrench.
- 2. A simple cam mechanism pinches the plate between two bars when the cam is rotated through an angle of 60° to 90°. This is usually actuated with a Tommy bar, although pneumatic systems are used in rapid lock-up clamps.
- 3. Some presses utilize plate clamps which are detached from the cylinder and fixed to the plate edges by bolts set at intervals in the bars. The plate and bars are then attached to the cylinder by locating pegs in the depression gap.

Plate fixing and adjustment is designed so that the pressman can mount and tension the plate using a minimum number of tools. The leading and back-edge clamps may be arranged in short sections or in single cylinder-width bars, and are designed to hold the plate tightly to the cylinder body without the clamp bar bowing when tensioned.

The final plate position on the cylinder body and plate tensioning is permitted by adjusting bolts incorporated in the clamps. This gives a limited lateral movement of the clamp movement of up to 10 mm.

Once fitted, the plate image may not fall in the required position on the printed sheet. Advance or retard movement of the image can be achieved by rotating the plate cylinder body in relationship to the cylinder gears. The gear is attached to the cylinder body by bolts which pass through radial slots in the gear, which when loosened allow the cylinder body to be rotated a few degrees thereby changing its relative position to the blanket cylinder.

On sophisticated presses this circumferential movement is made by releasing a locking device and moving a hand wheel or lever on the outside of the press frame.

#### (b) Blanket Cylinder

The blanket cylinder has a rubber blanket wound around it. This facilitates the transfer of the image from the plate to the blanket, and thereupon to the paper (or other substrates), when the substrate is passed between the blanket and the impression cylinder. This is an advantage for the process, as even poorer quality stock can be used in offset printing.

This cylinder is dressed with a rubber blanket which is tensioned on the cylinder body by reel rods housed in the depression gap. The blanket bars usually run the entire width of the blanket and are fixed by bolts set at intervals in the bars.

Blanket bars are commonly detachable and allow the pressman to make the blanket on the bench and thereafter to clip the bars to the blanket reels by means of dowels or slots.



Other systems use pre-punched blankets which clip onto hooks in the depression gap or special slots in the blanket reels.

Blanket tension is obtained by rotating by rotating the blanket reel by pawl and ratchet device, worm gear or pneumatic mechanism.

The depression gap in this cylinder houses a system of grippers which are opened or closed by a spring actuated cam follower. Unlike the plate and blanket cylinders, the impression cylinder normally carries no dressing, but if dressing is used it is provided with a metal tympana cover or rubber dressing which is attached to the cylinder by suitable clamps and tensioning mechanism.

The press consists of two conventional printing units in tandem a configuration identical to a two colour press. Between the units a special sheet turning drum and gripper mechanism gives the press greater versatility. The turning drum incorporates a sheet turning mechanism, one set of grippers drawing the sheet away from the first printing unit, a second set of grippers taking fold of the sheet by its back edge while it is held firmly on the turning drum. At a given point both sets of grippers hold the sheets momentarily, then the first set of gripper release the sheet to allow the second set of grippers to draw the sheet away to the second printing unit. This action has its variation among the press manufactures, but in each case the sheet is turn over before it passes through the second unit.

The delivery cylinder or the delivery drum facilitates the printed sheets to be transferred on to the delivery end.

## (c) Impression Cylinder

The impression cylinder is just a bare cylinder that acts to provide the necessary pressure to impress the image from blanket to the substrate. Pressure settings are varied between the impression cylinder and blanket cylinder when stocks of varying thickness are used.

## 2.3 Inking System

## The Inking System - Construction of Typical Inking System

**INKING SYSTEM REQUIREMENTS:** It must be capable of thoroughly breaking down the ink structure so that only minimum amount of thinning agents must be added to the ink in the duct. The inking system must be able to distribute ink quickly so that the forme rollers are never unevenly covered with ink. This makes possible the printing of "solids" deigns which are uniform from gripper to back edge of the sheet. In order to achieve this, the system of rollers must represent a large surface area and consist of rollers to various sizes which subject the ink to shearing action. The inking system must also provide the means of easy and quick control of the amount of ink supplied to the plate, and also of the relative distribution of ink across the plate.

## **Press Inking System**

The goal of any inking system is to place a uniform layer of ink across every dimension of the printing plate. The lithographic process is unique in that it requires the ink from rollers to pass in contact with the non-image areas of the plate without transferring ink to them.

The function of the ink-roller system is to supply a fresh adequate film of ink to the plate image during each revolution of the cylinders. To do this the individual features of roller layout, their number, diameter and coverings have to be considered.

The ink film thickness determines the strength or density of a color. There are two separate controls for overall and localized increases or decreases in ink volume keys. Here are some of the factors involved in ink distribution:

- Fountain roller (ball)
- Fountain blade
- Ink keys
- Ductor roller
- Ink train
- Oscillating or vibrator rollers
- Form rollers
- 1. The roller system must be so arrange that the ink is milled to the required consistency without the head to thin the inn with varnish.
- 2. The storage capacity of the roller system must be adequate to effect good recovery of the plate roller ink film during each cylinder revolution.
- 3. Ink should be evenly and quickly distributed to other rollers.
- 4. Roller arrangements should permit rapid alteration of the ink film thickness when necessary.
- 5. When a roller which is cover with an even film of ink is brought in contact with an un-inked roller of the same diameter, the ink film splits and approximately 50per cent of the ink passes on the roller one revolution.

## The following two ink roller systems are used in modern machines:

#### **Pyramidical System**

The inner unit consists of a set of roller that transfers the ink from the ink fountain on to the printing plate. The ink is taken from the ink fountain by fountain roller. The thickness of the ink film given by this is regulated by means of the ink fountain blade. The fountain blade can be adjusted by regulating screws (set screws). The ink is passed to vibrato by doctor roller and to distributor. Then a film of ink is supplied to the metal plate, by the help of the form rollers.



From this diagram it will be apparent that all the rollers in this type of inking system have approximately the same diameter and vary between each other in diameter by small amounts. Tracing the flow-path it will be seen that the primary path of fresh ink flows to the first plate inkers. The fresh ink on the front roller counters the main front of moisture on the plate. With these rollers registering emulsification with fresh ink, the remaining plate inkers function by equalizing the ink film on the image.

## **Drum Roller Inking System**

In this design diameter drum is included in the roller pyramid. It shows that the ink flow path can be traced to feed the last two plate inkers with fresh ink.

The first two plate inkers take the second supply of ink. The function of the large drum is to increase the storage capacity of the pyramid, thus increasing the recovery of the ink film during each revolution directing the fresh ink to the last two plate inkers the designers propose to apply fresh ink to the image as it leaves the rollers, thus giving added tone and density to the print. The first two inkers are so arranged to remove excess moisture from the plate and to convey it to point in the roller train where it can be evaporated and effectively controlled. This inking system is giving satisfactory results.

#### Ink Duct

The ink duct is a reservoir from which ink is metered to the roller pyramid. It incorporates a large steel drum which rotates at a controlled speed in a trough of ink. As the drum turns a film of ink is carried on its surface, and the thickness of this film can be controlled by adjusting the spring steel blade which is fitted close to the drum surface. The finger screws are turned to either open or close the gap between the blades and drum. Care must be taken when adjusting the blade always begins by opening the blade gap fully and turning the finger screws from the centre, working onwards to the ends. When setting the blade initially use a 0.075 mm feeler gauge between the blades and drum. The final setting will depend on the amount required on the printed sheet. The ends of blade should not be pinched so tight as to make it difficult to turn the drum, this will only cause the blade to wear, making future setting difficult. The duct roller is rotated by pawl and ratchet which can be adjusted to give a variable stroke.

#### **Ink Feed Roller**

This roller is otherwise called ductor roller or lifting roller. Does the cycle in which the duct roller in turned feed roller moves into contact with it and takes a strip of ink from the drum. The feed roller then moves into contact with the roller pyramid and transfers the ink to the roller train. Width of the ink strip takes from the roller may be determined, either by a length of the time which the feed roller remains in contact with the rotating drum roller (Dwell) or by the stroke of rotation given to the duct roller while the feed roller makes intermittent contact.

#### **Reciprocating Rollers**

Reciprocating rollers given this name because in addition to revolution they also make intermittent lateral movement are generally made of steel with a coating of copper or plastic material. Copper has been selected because it has a good affinity for ink plain steel rollers presented when moisture in the ink pyramid caused the ink on the steel rollers to strip making ink flow difficult.

#### **Drive Rollers**

The ink pyramid derives its drive from a number of fixed metal or plastic covered rollers which are rotated by gears or chains connected to the main drive of the press. All the resilient ink rollers and are usually designed to rotate the rollers in contact with the plate at the same surface speed of the plate cylinder.

#### **Intermediate and Plate Inking Rollers**

The size of the pyramid and the number and diameter of the rollers will determine the ink rolling power of the system consider and inked roller brought into contact with a large-diameter cylinder. On completion of one cylinder revolution the ink film transferred to the cylinder will vary in thickness with distinct, fall off points which correspond directly with the diameter of a small ink roller. With an increased in the number of ink roller the same fall-off point will be evidence when this occurs on the press the fall-off points may be quite noticeable on solids and tints, in the form of streaks running parallel to the gripper edge of the sheet. To overcome this tendency the plate inking rollers are made in varying diameters which results in the fall-off occurring in non-coincidental points on the plate, thus eliminating the streak. This has a drawback, however in that rollers of varying diameters have different rotating surface speeds which unless maintained within close to tolerances will cause early wear of plate image and generate heat in the roller pyramid.

A number of small-dial rollers are often added to the pyramid at strategic points to act scavengers. Their placing is important as they function by the manufacturer and is described in the manual. However, there are certain principles which may be followed:

- 1. Remove all removable intermediate and form rollers.
- 2. Check that ink storage drums are parallel with the plate cylinder.
- 3. Set doctor roller to ink storage drum. Paper strips are used for paralleling. The runner which operates the doctor roller must be in position at the top of the cam.
- 4. Remove fountain blade.
- 5. Set fountain roller to the doctor roller.
- 6. Return fountain blade using feeler fauve (0.15) mm. the blade is parallel with the fountain roller, using the fountain keys. The machine has checked the parallelism between doctor roller and storage drum, and between the fountain and doctor roller. Then it is ready to set the intermediate plate cylinder up to the bearer height.
- 7. Set the form rollers. Since the rollers must to the both plate and distributor or rider, the roller sockets are designed to move in and eccentric with either one or the other. If the roller socket so designed that the setting follows, the arc of plate cylinder, the roller must be set to the plate. If on the other hand, the roller socket can follow the arc of the rider, the first setting should be to the rider.

#### **Roller Wash-Up**

Modern presses are equipped with an automatic wash-up device. This consists of a metal, fiber or rubber blade which is adjusted to contact a metal intermediate roller high in the ink roller pyramid. The ink wash-up solvent is stripped from the rollers by the blade and the waste run into a tray situated beneath the blade. The following points are important for good wash-up.

- 1. Commercial solution usually contains anti-oxidants and deep cleaning spirit which is better for roller maintenance than white spirit.
- 2. Wash-up one half of the rollers at a time. This allows the dry side to drive the roller pyramid without roller skid.
- 3. Increase the press speed for wash-up. This ensures that the roller wash-up solvent carries the ink into the tray before it has time to evaporate into the air.
- 4. Care must be taken in cleaning the roller ends will mean longer roller life and free from kitties.
- 5. Make it a part of routine to inspect the rollers, roller surfaces and check the settings regularly.

## **Inking System-Problems**

In offset printing, the ink is transferred from the printing plate to the blanket and from there to the paper.

- The tack of an ink is particularly important at the moment of transfer to the paper:
- If the tack is higher than the stability of the paper surface will permit, then the paper will start picking.
- The higher the speed of a press, the higher the tendency to picking, if a paper, only slightly sized, is printed with unmodified inks.
- On a press which runs very slowly, scrumming will start, if the tack of the printing ink is not high enough.
- Viscosity and tack of a printing ink may be modified by adding thinners, pastes and varnish.

#### In doing so, two facts should be taken into consideration

- 1. The ink manufacturer provides the printing inks with certain properties as requested. They are modified or possibly even lost by unsuitable additives.
- 2. All additives change the concentration of the colour pigments, that is, the tinting strength is reduced, as is the drying capability.

#### And now a few rules for the use of additives!

- As a matter of principle, the particular purpose should be specified when ordering the ink.
- To correct the consistency, there are three types of additives: printing oil, printing paste and varnish.
- Printing oil makes the ink more fluid and short. Never add too much of it, since a fluid and short offset ink tends to deposit on the damping rolls.
- Printing paste makes a printing ink short, but not fluid; consequently it is well suited to prevent picking.
- Varnish finally is available in various viscosities in order to modify a printing ink from fluid to stiff. The use of it never makes a printing ink shorter.
- When different printing inks are mixed, the printing properties of the resulting mixture will always be inferior to those of the unmixed printing inks.
- Brightening a printing ink with transparent white always reduces the fastness to light.
- Only in exceptional cases more than 5 % opaque (zinc) white should be added, since opaque white will effect a change in tone and will easily bleed in the dampening solution.
- Drying agents may only be added up to the recommended limit; adding drying agents beyond this limit will frequently tend to reduce the drying capability. If in doubt, it is best to mix the ink the day before its intended use and to bad samples of it on a piece of paper to test the drying properties.

## **2.4 Dampening System - Construction of Conventional**

The purpose of the dampening system is to apply a very thin layer of water or moisture to the plate. The water is actually a special mixture of chemicals called fountain solution. The fountain solution keeps the non-image areas of the plate desensitized and printing clean. The separation between printing image area and nonprinting area is accomplished chemically by having:

- Image areas repel water and accept ink.
- Non-image areas accept water and repel ink.

The fact that a lithographic plate must be damped before it is inked with a thin film of water is the fundamental. Unless system functions efficiently good printing will not possible.

- 1. They system must capable of applying a very thin film of moisture to the plates entire nonimage area.
- 2. There should be efficient method for so maintaining the supply of moisture that required film thickness constant.
- 3. Any required change in supply required by the mechanism used should be immediately effective i.e. within a revolution of plate's width.
- 4. It should supply required moisture across the plate width.
- 5. The dampening system should not cause any under absorption of image or introduce foreign matter.
- 6. The system should be economic to install and maintain.

The dampening is designed to apply an even film of moisture to the plate while the machine is running at speed. The conventional dampening system consists of five dampening rollers, the fountain pan, fountain stops, the doctor camp, and fountain ratchet. Fountain stops are provided locally to reduce the amount of water applied to the plate. This is necessary when some parts of the plate require less moisture than others. The ductor cam provides the means controlling the time during to ductor roller rests again the fountain roller and thus provides the means of controlling the amount of water to the plate. The conventional dampening system has two plate dampening rollers which are covered with fabric, driven by a metal reciprocating roller, water is conveyed to the metal roller via a moving feed roller from the fountain roller which rotates in a pan fountain solution.



The water fountain or pan is reservoir for the dampening solution. In the water pan a roller is called duct roller that may be either of brass, chrome plated or cloth covered. The duct roller or fountain roller rotates in the pan itself. The ductor roller rests intermittently against the duct roller. The ductor roller is generally covered with molten cloth. It soaks at the water form the duct roller. When the ductor contacts the metal distributing roller, some of the surplus water is distributed to the metal roller. Then the metal roller distributes the water to the two form dampening. The two from dampeners supply water to the plate.

#### **Construction of the Plate Dampening Roller**

The plate dampening roller normally consist a roller spindle made of steel over which a layer of natural rubber or synthetic rubber will be coated. The rubber roller is covered with some wrap material namely molten or flannet or seamless sleeve. Now a days paper cover dampening are also in use.

Rubber rollers are made from oil resistant pigments synthetic rubber which is formed over the steel rollers stalk. Natural rubber is not suitable because it absorbs oil and solvents becoming sticky in the press.

#### Manufacture

In making rubber rollers the various ingredients are weighed out and the mixture is milled by passing through large steel rollers which reduce it to a blasted condition. Mixed with various compounds the blasted rubbers is then fed into 3 roll calendar which form the rubber into thin sheets, which are used in the rubber roller.

These sheets of vulcanized rubber are out into sections which are wrapped around the roller stack, taking care to remove all air bubbles. The roller is buildup to a diameter which is greater than which is finally required.

The buildup rubber sheet are kept in place by spirally and tightly wrapping with fabric, after which the roller is placed in the vulcanizer and cured under condition of high temperature and pressure.

After vulcanizing the roller is set up in a lathe and ground true to the correct diameter, the final finishing off being done with the empty paper. Now the rollers are ready for supply and use.

#### **Scavenger Roller**

One of the problems which occur with conventional damping system is the accumulation of the ink on the dampers. This occurs more frequently when bringing large solid or when the ink is of low viscosity. The metal roller based as a scavenger by allowing it to pick up ink from the dampers, then keeping them clean (mostly coated with copper).

#### **The Dahlgren Damping Unit**

This damping system has been widely used. It consists of the water fountain roller (1) with chromium surface and metering roller (2) The damping solution is applied to the plate by the first ink form roller. (3) At least 25% to 30% alcohol must be added to ensure that the water can reach the plate via the ink form roller. (4) Which is continuously supplied with fresh ink by the ink pan (5) in this system the ink form roller fulfils a double function. It operates partially as an inking roller and partially as a damping roller.

#### **Damping Rollers Setting**

Dampeners are set in the offset machine with the paper strips used. The paper strip must be soaked in the oil. After the strips are cut to size that are laid flat and machine oil is apply to both the sides, after which they are wiped dry. This is necessary because dampeners should be set when wet or dry unoiled paper, when wet tears the paper strips. After natively strips of acetate photographic film base may be used. In this case the gelatine emulsion is removed from the photo film.

- 1. Fix the plate on the plate cylinder up to the bearer height.
- 2. Fix the damping rollers in the socket provided in the machine.
- 3. Using strips of .003 to .004 inch oiled paper or film. Set the dampeners to the vibrator, set the bottom damping roller first. The strips of oiled paper or films are 2 inches wide and 8 inches long and are placed about 2 inches from each end and between the damping rollers and vibrating roller. Each roller is adjusted until each strip has an identical light ball.
- 4. Turn the press until the damping roller is in position to contact the plate. Place the two strips under roller (or both ends) and drop the roller on to the plate. Then adjust dampeners to plate until an identical pull is obtained on both strips. The dampeners are set slightly tighter to vibrating roller than to the plate.
- 5. Tighten the device which holds the dampeners in place.
- 6. Set ductor roller to the vibrator and ductor in the fountain.

The bottom dampener is best set to the vibrator roller and the plate with a slightly heavier contact than is used when setting the top dampener. The purpose of this is to prevent the top dampener from starving the bottom roller by removing the most of the water from the vibrating roller. More uniform damp is obtained when the bottom dampener supplies the water to the plate and the top one distributes and removes the surplus. Care must be taken not to set the roller too tightly. But there must be sufficient pressure to prevent skidding. The plate life is shortened if they are set two heavily.

#### **Continuous Flow Dampening System**

In this system, there are no covers placed over any of the rollers. The soft rubber-form roller moves directly against the plate and supplies a constant flow of dampening solution to the hydrophilic areas of the plate. The continuous-flow dampening system can be further subdivided into the type that supplies dampening solution directly to the plate and through one, usually the top, ink form roller. These systems are frequently used on duplicator presses and have gained considerable acceptance in recent years.

## Dampening Solutions and Its Importance - Its composition, Alcohol and Alcohol Substitutes

It printing conditions are ideal it is high enough to use "plain water". The use of alcohol has been referred earlier. The main purpose to reduce the surface tension and improve the melting characteristic of the solution enabling the non-image areas of the plate to reject ink by means of a thinner dampening filters. The thinner film results in improved print quality and brighter colour.

#### Advantage of alcohol dampening system

- 1. More stable dampening, thus less colour variation.
- 2. Brighter colour effect.
- 3. Less emulsification.
- 4. Rapid achievement of ink and water balance.
- 5. Less moisture transferred to blanket and therefore to stock.
- 6. Elimination of fiber deposits (from dampening covers)
- 7. Dampening rollers require less frequent cleaning.

pH in dampening (pH means Potential Hydrogen):

This is a measure of the acidity or alkalinity of paper or dampening solution in printing.

- The pH scale of measurement is probably well known to a printing technician.
- The pH value is a number indicating hydrogen on concentration of a solution expressed.
- The scale from 14 (strongly alkaline) to 1 (strongly acid) with 7 as the neutral point (pure water)
- The difference from one number value and next is logarithmic is example: pH 4 is ten times more acid then 5.
- There are several methods of measuring pHs The simplest form use of paper strips which react by colour change when dipped in the solution to be tested. The change is matched in a colour scale marked with full j pH scale.

#### **Setting Rollers in Conventional Dampening System**

Plate dampers are set in the same fashion as the plate inking rollers. A plate and correct packing must be fitted to the plate cylinder and the cylinder rotated to bring the plate underneath the dampers.

Strips of plastic film 30 mm wide and 0.1 mm thick are used for setting the rollers. The order of sequence is not important although it may necessary to begin with the most inaccessible roller first. The strips are placed at either end of the damper between it and the plate. On large presses a third strip is placed in the centre of the damper.

With the damper control handle set at 'ON' the damper locknuts are released and the adjusting bolts turned until the plate-damper contact will allow the strips to be withdrawn with reasonable resistance. If the damper is set too hard to the plate it will produce rapid image wear and also scrub the ink off the image and become badly contaminated with ink. After tightening the locknuts, the setting must be rechecked before proceeding with the next roller. The setting of the dampers to the intermediate roller is performed in the same manner using strips at either end of the rollers. The setting between damper and the intermediate roller should be slightly firmer than the plate/damper setting. This is to ensure that the intermediate/damper setting is too hard the water will be squeezed out of the damper and moisture supply to the dampers will be faulty.

#### **Feed Roller Setting**

This roller is cloth-covered and makes intermittent contact with the intermediate roller and the fountain roller. The feed roller is usually fixed in brackets which swing on a pivot at either end of the roller. Contact between the feed roller and the fountain roller is normally spring-loaded. Contact between the feed roller and the intermediate roller is usually cam-operated. Using plastic strips of film set the pressure between the feed roller and the intermediate roller and the intermediate roller first and follows this by setting the feed to the fountain roller. Check the setting after locking up the adjusting bolts.

#### Metering Dampening on Conventional System

The fact that a lithographic plate must bump before it is inked with a thin film of water is the fundamental principle. Unless system functions efficiently good printing will not be possible. A measured quantity of dampening solution from the dampening unit is paste on to the plate automatically.

#### **Operating Problems of Dampening Systems**

The non printing areas of an offset plate hydrophilic and repel ink. During the run, they are mechanically and chemically attacked. To ensure, that the ink-repellant property does not subside, additives are mixed with the dampening medium. Usually, most additives use chemical buffers to regulate the pH-value.

The pH-value indicates, if the water is acid, neutral or alkaline and to what degree.

Acid or alkaline reaction of an aqueous solution is caused by the content of hydrogen ions. The pH-value is expressed in logarithmic figures from 0 to 14.

Neutral water has pH-value of 7 below that figure; the water is increasingly acid, above 7 increasingly alkaline.

In offset printing an unsuitable pH-value of the dampening medium has negative effects on the printed result.

Too high an acid content of the dampening medium shortens the life of the plate. The printing ink is affected as well and the drying process is retarded. In extreme cases, the printing ink will no more dry at all.

Too high a pH-value leads to increased dot gain, the printing ink emulsifies and the whole plate is covered with a haze of ink-it scrums.

The varying pH-value of the paper to be printed resp. of its surface possibly also influence the printing process, since not only the ink is transferred to the paper via the blanket, but small amounts of dampening medium as well. Paper dust from the surface of the sheet tends to cling to those areas of the blanket which are moist. At the contact line between plate and blanket some of this paper dust is also transferred to the plate surface and will eventually reach the dampening form rollers. Consequently, the pH-value of the paper can affect the plate surface as well as the dampening medium. Adverse effects however will only occur, if the pH-value of the paper is substantially beyond the normal range.

As a rule of thumb one might say:

- Coated papers are usually in the alkaline range,
- Natural papers nearly always on the acid side.

To prevent negative effects on the pH-value when using different grades of paper, additives mixed with the dampening medium stabilize the pH-value.

#### Water hardness

The quality of the water is extremely important for trouble free printing

Tap water is not chemically pure water. Its suitability for the printing process is determined by the kind and the amount of salts dissolved in it.

Water hardness is a measure for the content of salts of alkaline earth metals and is expressed in "degree German hardness (OdH)".

10 dH is equivalent of 10 mg calcium oxide in one litre of water.

For offset printing, the hardness should not exceed 150 dH. If the water used is harder, calcium or magnesium may form deposits on printing plate, blankets and rollers and cause disturbances of the ink splitting process in the inker. More than that, the chemical reaction of calcium salts with the fatty acids contained in the ink vehicle can be cause the formation of lime soap. Lime soaps generated this way act as wetting agents and disturb the printing process by making hydrophilic areas ink receptive and vice versa.

These printing problems can be prevented by installing a water softener.

It deposits are already existent on the surfaces, they may be removed by cleaning them, using a solution of 50 g tartaric acid per 1 liter of water.

This method however is very time-consuming and will definitely not replace water softening and will definitely not replace a water softening unit.

## 2.5 Delivery System

After registration on the freeboard the printing stock is passed through the printing unit with the leading edge of the sheet held firmly in the impression cylinder grippers. The sheet is then transferred to the transport grippers who carry the sheet to the delivery pile where it is stocked neatly.

Intermediate transport of the sheet is achieved by a series of gripper trolleys mounted on a pair of endless chains. On the small press there may be two sets of grippers in the chain, this number increasing to ten or more on larger machines. The grippers close upon the leading edge of the sheet while it is being held by the impression cylinder grippers. A smooth transfer of the sheet from one set of grippers to the other is essential because while this transfer takes place the sheet is still passing through the impression nip.

The printed sheets are transported wet side up and dropped gently onto the delivery pile. In the majority of cases the sheet path to the delivery bay directs the sheet around transport drums, skeleton wheels or star wheel assemblies.

#### **Delivery Systems**

On small offset presses the delivery of the sheet is directly placed into the delivery tray. The chain delivery system transports the sheet into the delivery bay where a camp opens the grippers and the sheet falls onto the pile where it is jogged into a neat stack.

Simple delivery systems are sited close to the printing unit and limit the height of the delivery pile. In this type of delivery printed sheets are fall on to the pile in rapid succession with a danger that the wet ink will set off onto the other sheets.

The extended delivery system (or high pile system) delivers sheets onto the pile which is sited further away from the printing unit. The additional distance travelled by the sheet allows the fresh ink to gain an initial set before it contacts other sheets, thus minimizing set off. The extended system is essential for high speed presses where the period between printing and stacking must be as long as possible.

# **2.6** Types of Sheet Transfer - Chain Transfer, Single Drum and Three Drum Systems

**Chain Transfer:** The chain delivery system transports the sheets into the delivery bay where a camp opens the grippers and the sheet falls onto the pile where it is jogged into a neat stack.

**Single Drum and Three Drum System:** This is a lightweight drum which gives support to the sheet at a point where the transport grippers change direction. The drum may be dressed with wire coils, emery-type pads, grater foil or rubber grommets, each designed to give support to the wet ink side of the sheet without marking it. These supporting elements can be arranged on the drum surface to contact the margin and non-image areas of the printed sheet.

An air cushion drum is a superior alternative for providing sheet support without marking. The drum is designed with an air permeable surface and pressurized air is forced through the drum to form an air cushion under the sheet thus preventing direct contact between wet ink and the drum surface.

## **Delivery Section - Sheet Decurler - Joggers**

On large presses a system of delivery grippers or suckers are used to take over from the transport grippers and decelerate the sheet before dropping it onto the pile.

Sheet decurler neat stacking of printed sheets is hindered if the sheets enter the delivery with a pronounced curl. The major cause of the sheet curl is the manner in which the sheet is pulled away from the blanket after impression. The sheet is forced to cling closely to the blanket as it is passed through the nip and if ink coverage is wide the grippers produce a one-side stress to the sheet. This mechanical stress becomes more accentuated towards the back edge of the sheet with the result that a curl is produced there (tail end hook).

The sheet decurler consists of a suction box running the width of the sheet and sited in front of the delivery bay, the sheets passing over the box before the grippers are released. The printed sheet with its image uppermost is drawn over the suction box by the grippers, the sheet pulled down into the vacuum through, both forces reducing the curl before the sheet reaches the delivery. The vacuum suction in the box can be controlled to suit various weights of stock.

Jogging joggers are metal side guides situated at the outer edges of the pile which move gently hog the falling sheets into a neat pile. A jogging action is also given to the rear pile guide or to the front delivery gate. Side joggers are adjustable for various widths of stock, the normal setting for sheet depth being the adjustment of the rear pile guide.

#### **Sheet Guiding Devices**

These are used to prevent sheet from buckling or bouncing as a result of the momentum during the repaid speed of the forwarding operation. The sheet must travel forward at approximately the same speed as press operates, since one full sheet is advanced at a time to the registering. The speed of the moving sheet is consequently very rapid; hence special attention must be paid especially when light weight and large size are fed. The sheet from the pile board has to travel straight to the front lays and then the side lays automatically register them before entering to the grippers of the cylinder for printing. To achieve this there are certain devices such as slow down rollers suction devices runners etc.

#### **Delivery Assist Devices**

#### **Delivery Push-Button Control Station for Mahor Tress Operations**

The sheet counter tells how sheet may have passed through press. The "tip" button permits the operator to trip the off printing pressure from the delivery end of the press.

#### **Jogger Control**

The delivery grippers release the sheet after it is printed, and it floats the release of sheets from the delivery grippers. The pile lowering crank manually raises or lowers the delivery pile. A down feed switch automatically controls lowering the delivery pile when the press is operating on printing pressure.

#### **Positioning the Joggers**

Joggers assist in producing a neat, straight pile on the delivery pile board. To adjust, first place a sheet of the stock to be printed on the delivery pile board. Move the gear-side jogger until it

touches the edge of the sheet. Lock it in position. Inch the press forward until the feed jogger reaches the centre of the piles board. Stop the press. Move the jogger until it contacts the edge of the stock. Lock it in this position. Repeat this procedure to locate the rear jogger.

#### **Deliver Mechanical Control**

The deliver gripper releases the sheet after it is printed and it floats against the delivery gate. The cam control knob times the release of sheets from the delivery grippers. The pile lowering-crank manually raises or lowers the delivery pile. A down-feed switch automatically controls the lowering the delivery pile when the press is operating on printing pressure.

#### **The Delivery Stripper Fingers and Grippers**

The delivery stripper fingers guide and retain the sheets as they are released by the delivery grippers. They are located between the grippers and above the sheet. The delivery grippers receive the printed sheet from the impression cylinder.

#### Suction Slow-down Rollers and Blow down Wedges

This refers to the sheet after it is printed and then released by the grippers should fall on the pile. The speed of the sheet while it is travelling for delivery has to be controlled, for this we have the slow-down devices in the form of suction nozzles, wheels or boxes which apply rapid deceleration to the sheet after it has been released by the grippers.

On large presses a system of delivery grippers or suckers are used to take over from the transport grippers and decelerates the sheet before dropping onto the pile.

Blow down refers to the sheet being controlled mostly after printing. The printed sheet while it is going for delivery it has to move slowly, it has to go and fall straight into delivery pile. For this the compressed air which is supplied through an arrangement blows down the air and that is a wedgeshaped one. Hence the air is blown down through the wedge shaped device so as to control the speed of the printed sheet and it falls straight on to the delivery pile.

#### Anti-Set off Spray Equipment

If the press is fitted with anti-set off spray it may be necessary to adjust the position of the spray nozzles to give adequate coverage of the sheet. Once the settings have been made, the feeder and delivery of the sheet should be checked by running fifty sheets through the press at speed, making final adjustment until satisfied.

Time taken to set up the sheet transport in this way will allow the pressman to concentrate his attention on the printing process during make ready.

#### 2.7 Materials used in Offset Printing:

**Plates:** The plates used in offset printing are thin, flexible, and usually larger than the paper size to be printed. Two main materials are used: metal plates, usually aluminum, although sometimes they are made of multi metal, paper, or plastic, polyester plates, these are much cheaper and can be used in place of aluminum plates for smaller formats or medium quality jobs, as their dimensional stability is lower.

**Inks:** There are many types of paste inks available for utilization in offset printing. These include heat-set inks, cold-set inks, ultraviolet (UV) curable inks etc.

Some other chemicals used include fountain solutions, and solvents, surfactants, cleaning solutions and oxidizers used in offset printing process.

#### 2.8 Single Colour and Multi-Colour Offset Presses - Web Offset Presses

#### 2.8.1 Web Offset Printing - Introduction

Typically long run printing jobs have benefited with the web offset presses considering the speed of printing and finishing time. Web offset is a form of offset printing in which a continuous roll of paper is fed through the printing press. Pages are separated and cut to size after they have been printed. Web offset printing is used for high-volume publications such as mass-market books, magazines, newspapers, catalogs and brochures, direct mail, catalogs, legal forms, documents, newspaper inserts/ads, financial data, brochures, advertising materials, leaflets, promotional materials and other marketing applications.

Some web offset presses transfer text and images to only one side of the print medium at a time. Others can print on both sides simultaneously. The paper width is usually between 11 and 56 inches (approximately 28 and 142 centimeters). The paper is fed through the system at speeds ranging from 5 to 50 feet per second (approximately 1.5 to 15 meters per second).

Web offset printing differs from sheet-fed offset printing, in which individual pages of paper are fed into the machine. Sheet-fed offset printing is popular for small and medium-sized fixed jobs such as limited-edition books.

There are two basic types of web presses with two sub types. These include:

- Heatset web heat dries the ink
  - Blanket to blanket prints both sides of the web at the same time.
- Coldset web ink dries by air and absorption
  - Blanket to impression only prints one side at a time

Depending upon the ink drying instance web-fed presses classified as heatset and cold or non heatset offset web presses. When soaked with paper the ink dries in cold web offset printing. In turn heatset web offset printing use heaters or drying lamps to set the inks. Heatset presses used on coated and uncoated paper while coldset presses cannot print on uncoated paper stock.

The web press is similar to the sheetfed press in that it contains an infeed section, printing units and delivery section. However, because the web prints rolls the various sections are different from those used on a sheetfed press.

All web presses have some commonalties such as an infeed, printing units and delivery. **Infeed:** 

Paper is delivered to the press by the infeed section. The infeed section typically contains a roll stand to hold the paper rolls; a splicer which automatically splices the end of one web to the beginning of another (except on small business forms presses), a web-steering device which controls the sidelay (side-to-side position) of the infeeding web; and a tensioner that maintains the proper tension on the web as it enters the press

#### **Printing Units:**

Printing units are similar to that of any other offset printing press; inking unit, dampening unit, plate cylinder and blanket cylinder. Most high speed presses use the blanket-to-blanket arrangements so that printing of both sides of the web is possible.

Web presses are made up of several printing units usually numbering from 3 up to or more than 9. Like sheetfed, each printing unit contains an inking system, a dampening system, a plate cylinder, a blanket cylinder, and an impression cylinder.

The oven drier and chill rolls work together to ensure that the ink on the printed sheet is dry and set to prevent ink set-off. Most high speed web presses contain one or two silicone roll coaters. The units follow the chill rolls and can apply a water/silicone solution to one or both sides of the web. Most modern high speed commercial web presses have a press console. The press console provides electronic control for register, image control, ink and dampening easily.

#### **Delivery:**

The delivery section can consist of a variety of devices, from a simple sheeter, which cuts the moving web into sheets of the required size, to a combination sheeter and folder, which can both fold the web into final signatures (group of pages) and trim the signatures to size. Small business forms presses can print from a roll into another roil for future processing.

#### 2.8.2 Difference between Sheet-fed and Web-Offset

On Sheet-fed presses, the substrate is fed into the press one sheet at a time. Sheet-fed presses offer several advantages. Because individual sheets are fed through, a large number of sheet sizes and format sizes can be run through the same press. Sheet fed presses are commonly used for printing of short run magazines, brochures, letter heads and commercial job printing etc.

Web-fed presses print a continuous roll of substrate or web, which is later cut to size. Web-fed presses are much faster than sheet-fed presses, with speeds up to 80,000 cut-offs per hour (a cutoff is the paper that has been cut off a reel or web on the press). The speed of web-fed presses makes them ideal for large runs such as newspapers, magazines etc.

## **2.9 Various Press Configuration**

- a. Single colour Press:
- b. Multicolour Press
- c. Perfecting Press
- d. Satellite type Press
- e. Common impression Cylinder Press.

#### a. Single colour Press

As a general rule single colour offset machines follow a pattern with plate cylinder mounted at the top surrounded by inking and dampening unit and with the blanket cylinder below and slightly

forward or directly below it. The impression cylinder is set behind this cylinder and on a slightly lower end from which it is taken by a set of swing grippers which transfer it to the gripper of the impression cylinder. The sheet is held in these gripper while it receives impression and after it has been printed it is transferred to one of the sets of grippers which form part of gripper aid chain delivery system which carries the sheet to the final delivery.

#### **b.** Multi colour press

For multi colour printing two-colour machines or four-colour machines are used. In two colour machines we have two units each representing one colour or there are presses which place images from two plate cylinders on a common blanket, printing two colours with one impression. For inplant and quick print operation, several manufacturers have automated models.

The vast majority of magazines and colour books are produced using four-colour process. Originally the artwork and originals were separated photographically using filters to produce four printing plates. Today the separation is carried out digitally.

The four ink colours are Cyan (Blue), Magenta (Red), Yellow and Black - often referred to as CMYK. Because the inks used are translucent, they can be overprinted and combined in a variety of different proportions to produce a wide range of colours. Theoretically it is possible to produce an adequate range of colours using just Cyan, Magenta and Yellow. Indeed for a time three Colour Process was a viable option. However, in practice much better results are achieved with the addition of black. The black plate is used to strengthen the shadow areas and reduce the amount of CMY inks required.

agneta, cyan and black.

In four colour presses we have four printing units each representing one colour i.e. yellow, magneta, cyan and black.

So when the sheet passes through each of these units we get the multicolour printing. More precautions have to be taken by the press operator with regard to the control of ink, makeready of the machine and registration techniques.

**Registration :** Registration is to help align different colours to form a continuous tone image. Registration is printing specific extra marks so that different artwork can be aligned. Registration is a term used in the printing and desktop publishing industry. It is the method of
correlating color separations. Different printing devices have different methods of creating color. Often this requires a pass to create one colour component, and then another pass to create more. Combined these should create the optical illusion of colour. But by splitting the colour creation into many discreet passes the process becomes prone to error. These errors can mean that the optical illusion is broken and that the discreet colours become visible. One method of reducing and quantifying error is Registration.

Some of the important operations in printing multi colour jobs are:

- Checking impression pressure
- Make-ready of the machine
- Setting the feeders, front and side lays
- Adjustment of inking unit
- Adjustment of dampening unit
- Roller setting and ink grinding
- Fixing the plate
- Make-ready on the machine
- Registration of all colours

#### c. Perfecting Press

The term perfecting means printing on both sides of a sheet simultaneously. For colour printing two-colour machines are manufactured. In this type of presses we find images from two plate cylinders on a common blanket, printing on both sides i.e. first on one side and then the sheet is turned to get printed on the next side by means of a skeleton cylinder. The backup registration should be perfect.

#### d. Satellite Type Press

We find this type of press in newspaper and magazine printing. It is nearer to the common impression cylinder press. In this type of press we can print three or four colours on one side of a sheet. For example, in news paper printing the first and last page contains colour printing. The inside pages will be in black ink. In satellite press the first and last page of a newspaper will be printed in three or four colours.

#### e. Common Impression Cylinder Press

This is modern development in press design which allows a two unit press to be used for perfecting or by a simple adjustment used as a two colour machine.

The press consists of two conventional printing units arranged in tandem a configuration identical to a two colour press. Between the unit a special sheet turning drum and gripper mechanism are given the press greater versatility. The turning drum incorporates a sheet turning mechanism, one set of grippers drawing the sheet away from the first printing unit, a second set of grippers taking fold of the sheet by its back edge while it is held firmly on the turning drum. At a given point both sets of grippers hold the sheets momentarily, then the first set of gripper release the sheet to allow the second set of grippers to draw the sheet away to the second printing unit. This action has its variation

among the press manufactures, but in each case the sheet is turn over before it passes through the second unit.

#### **Small Offset Press**

Small offset press consists of a single unit i.e to print one colour only. The three cylinders namely plate, blanket and impression forms a single unit. The is used to print one colour and of small sizes. The examples of small offset machines are swift 150 etc. the size of this machine is crown folio. In olden days small offset presses were very popular. Now with the advent of computer most of the small jobs are done by DTP and then duplicating by risograph, Xerox machines to get more number of copies are printed.

#### Summary

The basic principle of offset is that ink and water repel each other. Image and non-image are on the same plane. The ink gets transferred to the blanket cylinder and press there on to the paper with the support of impression cylinder. The structure offset presses are named by their function: feeder, transfer, registration, inking, dampening and delivery. Each of these systems must be set up of "made ready" before printing can begin.

The feeder system ensures the transfer of sheet from the pile board to the registration system on the machine. The applying of water and ink to the plate and the delivery of the printed sheet after printing is done automatically by the delivery mechanism. The plate cylinder holds both the image and non-image areas. The blanket cylinder sets the image on to it from the plate cylinder and then passes on the ink to the paper. Pyramidical inking system is followed in modem offset presses. The other system is drum roller inking system. There are many types of rollers in the inking system. There are different types of dampening rollers in the dampening system on the machine.

The different types of rollers are reciprocating rollers, drive rollers, intermediate and plate inking rollers. The plate dampening roller normally consists of a roller spindle made of steel over which a layer of natural rubber or synthetic rubber will be coated. The dampening rollers are set in the offset machine with the paper strips used. The paper strip must be soaked in oil. After the strips are cut to size that are laid flat and machine oil is apply to both the sides, after which they are wiped dry. This is necessary because dampeners should be set when wet or dry unoiled paper, when wet tears the paper strips. Feeding and delivery are also set on the machine.

Single colour machine has there cylinders viz plate, blanket and impression cylinder. Multicolour offset presses means more than one unit to print more than one colour. Web offset is a form of offset printing in which a continuous roll of paper is fed through the printing press. Pages are separated and cut to size after they have been printed.

#### **Short Answer Type Questions**

- 1. State the principles of offset printing process?
- 2. Explain dampening system?
- 3. What is inking system?
- 4. Explain plate cylinder?
- 5. Explain about blanket cylinder?
- 6. Explain about impression cylinder?
- 7. What is metering dampening?
- 8. Explain jogger controls?
- 9. Mention about anti-set off spray equipment?
- 10. Explain perfecting presses?
- 11. What is Registration?
- 12. Write the difference between Web Offset and Sheetfed?
- 13. What are the materials used for Offset Printing process?

### Long Answer Type Questions

- 1. Explain about construction/ structure of a sheet fed press?
- 2. Mention about plate, rubber and impression cylinders and their purpose?
- 3. Explain in detail about the feeding and delivery unit of a press? Write various types of delivery systems.
- 4. State the structure of inking system and its adjustments on the offset press?
- 5. What do you know about printing rollers? How are they set on the machine?
- 6. Explain about dampening rollers? How they are set on the press?
- 7. Write about various press configurations? Explain about each one of them?
- 8. Explain about Multi colour Presses.
- 9. Explain about the problems of inking systems? Mention briefly about them?
- 10. Explain about Web Offset Presses and their Job suitability.

# unit **3**

# **Gravure Printing**

## Structure

- 3.1 Principles of Gravure Printing Process
- 3.2 Gravure Printing Presses
- 3.3 Rewinding Unit
- 3.4 Solvent Recovery Method
- 3.5 Nature, Use and Maintenance of Doctor Blade
- 3.6 Construction of Gravure Cylinder
- 3.7 Direct and carbon tissue Method

## **Learning Objectives**

After completion of this unit the student will be able to

- Give description about Gravure Printing Process and its Jobsuitability
- Give description about Rewinding unit
- Solvent Recovery method
- Nature, Use and Maintenance of Doctor Blade
- Construction of Gravure Cylinder
- Direct and Carbon tissue method.

# 3.1 Principle of Gravure Printing Process

The Gravure Printing is characteristically used for long run, high quality printing producing a sharp, fine image. Gravure is direct printing process, like letterpress with, however some major differences. Gravure printing is an example of intaglio printing because the image areas are in a sunken area and the non-image areas are in relief. The image is directly transferred from the image carrier, which is usually a cylinder, onto the substrate. The image is shaped on a discouraged or depressed surface. The area of the image comprises of honeycomb molded cells that are carved or engraved into a copper cylinder. When the cylinder rolls in an ink then the ink fills the cells of the cylinder. The doctor blade is positioned at an angle over the cylinder so that when the cylinder rotates, the excess ink that was picked up by the non-image areas are wiped clean. In the continuing motion of the cylinder, the substrate is fed in between the printing cylinder and the impression cylinder. By pressure, the ink in the cells is forced out onto the substrate. So that the ink is straight forwardly exchanged to the substrate and image is framed.



A gravure press is constructed with two cylinders per unit, a printing cylinder, which carries the image and an impression cylinder like in the offset process that applies the required pressure to transfer the ink. Gravure cylinders are usually made of steel. This cylinder has a number of tiny cells in it, around 50,000 to a square inch. The cells are protected by walls that are in relief. The surface of the cylinder is plated with copper to hold the image. The image is transferred photographically to the electroplated copper surface. The non-image areas on the copper are chemically etched or mechanically engraved to form the cells. Each cell varies in its depth, and this enables each cell to transfer varying densities of ink to produce tones. The ink used in gravure is in a liquid form.

**Jobsuitability :** The gravure process is used for specialty products like Wall papers and Vinyls. Some of the gravure printing applications include Printing Magazines, Flexible packaging, Giftwraps, Greeting cards, Labels, Cartons, Furniture laminations, Food Packagings, and others.

# **3.2 Gravure Printing Presses**

Gravure printing is normally a reel-fed printing method although sheet-fed machines exist in small numbers. Gravure is used mainly for large runs for magazines and directories on thinner paper. However, a significant number of applications are run on paperboard for high volume packaging such as cigarette cartons and large volume confectionery/liquid packaging. The presses used for printing packaging applications are different from the publication presses in two ways: they are narrower and print units are almost exclusively set up in a straight sequence horizontally and magazine printers can have print units set up vertically. The advantages of gravure printing lie in the high, consistent and continuously reproducible print result. Further, the advantage of fast ink drying (by evaporation) contributes to an immediate post-finishing of the printed goods. The process is ideally suited to situations where there is a range of print designs but a constant carton construction and size.

Most gravure presses are web-fed. There are several types of web presses used in gravure printing, including publication presses, packaging presses, product presses, label presses and folding carton presses.

# **3.3 Rewinding Unit**

The Rewinding units or separate machines are as important as the gravure machine itself. We are aware that in package printing most of the material is printed from reel to reel. While the unwind roll supplies the substrate, which passes through the printing units, the rewind roll at the delivery end of the machine ensures that the substrate is rewound as precisely as the unwind roll is procured from the supplier. The web aligner on the gravure machine fulfills this important necessity.

The printed roll is then transferred to a slitting and rewinding machine where the roll is slit according to the number ups in addition to removing the edges. The first operation that takes place on this machine is the slitting and the second operation is rewinding the slit substrate into smaller rolls.

Slitting and rewinding machines are available in different models to suit different requirements. They are of different construction for paper and plastics on one hand, and for heavy-weight materials such as paper boards on the other. These machines are provided with a scrap-duct which removes the scrap, shreds it and transport it after shredding to a disposal unit.

If should be remembered that the stock unwound from the roll at the feeding end of the press passes through the printing units and is again made into a roll by rewinding. But the problems related to each of the two operations, unwinding and rewinding, are not exactly the same. The roll to be unwound arrives at the printer's plant is in proper condition. It is often the product of rewinding in the plant of the manufacturer who supplies the stock. For unwinding, the printer is less concerned with the roll than with the web, its tension and position in particular.

On a Rewinding machine, attention must be concentrated on the printed roll. The basic function of a good rewind is to produce a straightly rewound roll wound to the desired tightness. The other function of the rewind is to rewind the web to the maximum diameter of the master input roll for all type of material from cellophane to paper board. The tension of the rewound stock is particularly critical in plastic film because these can be easily distorted. Distortion can be troublesome for subsequent fabricating operations.

# **3.4 Solvent Recovery Method**

Since solvent is an expensive ingredient of gravure ink and when it is used in huge quantities both in publication gravure printing and flexible package printing. It would be ideal if the vapor of the solvents are recovered, condensed and converted into liquid form so that the recovered solvent can be recycled economically and efficiently.

Therefore, the purpose of a solvent recovery system is to remove evaporated solvents from dryer - exhaust, air and the press room air and collect the solvent for reuse.

During the recovery process, the solvent undergoes a number of transformations that are described below:

- Solvent laden air is drawn from the dryer by large fans.
- The air is channeled through duct work to one or several absorbers.
- Absorbers are actually beds of activated carbon pallets.
- The pallets absorb the solvents as the air is forced through them.
- The cleared air passes out of the absorber and into the atmosphere.
- After the carbon bed is reasonably saturated with solvent, steam is forced into the absorber.
- This drives the solvent vapour out of the carbon and into the steam.
- This solvent vapour-steam mixture is then cooled and then condensed into a liquid state. When this mixture is pumped into a decant tank, the solvent and water separate into distinct layers (solvent is lighter than water).
- The solvent is recovered into a collection tank, from which it is returned to solvent storage for reuse.
- The water layer is removed to a collection tank for disposal or reuse.

# 3.5 Nature, Use and Maintenance of Doctor Blade

We are aware that doctor blade, though a very small device plays a very important role in successfully removing the entire ink from the non-image areas. Doctor blade is made up of very high quality steel called the carbon steel. It is a special type of strip steel, cold rolled, hardened and tempered.

A typical doctor blade has the following chemical composition.

Carbon (c)	-	0.095% -1.05% maximum
Silicon (Si)	-	0.20% maximum
Manganese (M <sub>n</sub> )	-	0.40% maximum
Phosphorous (P)	-	0.015% maximum

Another type of doctor blade is made up of stainless steel. These blades are used mainly for water based inks and coating. The blades specifications are basically same except for the difference

in the steel composition; corrosion resistant components such as chromium are used to protect the blade against oxidation or rust.

The chemical compositions of stainless steel are:

Carbon(c)	- 0.36% - 1.40%
Silicon (Si)	- 0.30% - 0.50%
Manganese (M <sub>n</sub> )	- 0.45% - 0,65%
Phosphorous (P)	- 13.2% maximum
Molybolenium (MO)	- 0.90% -1.10%

Non metallic materials used as doctor blades are polymeric such as polyester, fiberglass etc. they are used on counting rolls and sometimes is packaging and specialty printing. The life of plastic doctor blade is usually shorter than the metal blades.

Ceramic coated blades are nowadays being used to fight printing defects. These blades have longer blade life and may wipe much cleaner and more precise than other blades. The benefits of these ceramic blades are durability, printing quality improvement, decreased cylinder wear, and reduced cost.

#### **Maintenance of Doctor Blade**

Doctor blade should be maintained with extreme care in the day to day operation of every press room. Doctor blades are very sharp even after use. Any damage to its surface will not be able to remove the excess ink from the non image area. Where a doctor blade is not used or when it is removed from the holder it should always be covered with some type of safety cover. Extra caution and care is to be taken to prevent it from rusting. This can be done with the application of thin film of grease.

## **3.6 Construction of Gravure Cylinder**

Gravure cylinders are discussed in terms of its size and construction. When it comes to size of the cylinder it is described in two aspects. They are

- 1. The width of the cylinder
- 2. The diameter of the cylinder

Cylinders vary from 2.5 inches (64 millimeters) to about 40 inches (1016 millimeters). There are also cylinders which go upto even 55 inches (1.4 meters diameter).

The width of the cylinders is sometimes referred as length of the cylinder can go up to 144" (12 feet) from the minimum of 6 inches length.

The cylinder base is the physical structure lying under the surface that receives the image during engraving or etching. There are two types of gravure cylinder bases, they are

1. Sleeve cylinder (mandrel cylinder or cone cylinder)

2. Shaft cylinder (integral shaft cylinders).

A sleeve cylinder typically consists of a body with steel headers shrunk into each end. Sleeve cylinders are smaller and lighter in weight than shaft cylinders. Their cost is also low. The main disadvantage of sleeve cylinder is that different shafts are used for printing, preparing and engraving with inaccuracies between each of them. Sleeves are used in many parts of the packaging and specialty in printing industries. The modem sleeve cylinders are now coming with new press design with greater accuracy.

Shaft cylinders are equipped with permanently installed shafts. When ready for printing, they are mounted directly into the press bearings. The main advantage of shaft cylinders is that same, accurate bearing surface can be used for printing, plating, machining and engraving. They also give uniform quality if they are well maintained. Today, all cylinders in the publication printing industry and a majority of packaging and specialist printing cylinders are shaft cylinders.

The base of the above cylinders, whether they are sleeve cylinders or shaft cylinders is made up of steel. This is because steel fulfils all of the requirements of accurate machinability and deflection as well as convenience of plating.

Aluminum cylinder bases have also been used as an alternative in the packaging industry. Its light weight can reduce transportation cost and makes cylinder handling very easy. For smaller cylinders, sleeves can even be lifted without the cranes. The main disadvantage of aluminum base is plating it with copper surface through electrolysis process.

A new composite material for small packaging cylinders recently entered the market. It is a special plastic that replaces sleeve tubes. This new type of sleeve is extremely light, easy to handle and store and very cheap to transport.

# 3.7 Transfer of image on the gravure cylinder.

### **Direct and Carbon Tissue Method**

During the period from the 1940s, modern impotents in gravure cylinder production for gravure was done either in the press itself or out sourced. Until early 70's, most cylinder preparation was done by chemical etching techniques.

For many years organic carbon tissue was the standard medium used for cylinder imaging. Carbon tissue was originally a gelatin mounted on a paper backing that was immersed in potassium dichromate to make it light sensitive. The procedure for the conventional gravure process involved two exposures to the carbon tissue. The first exposure was with a gravure screen to form the hard cell divisions, and the second was with the continuous tone film positive to vary the depth of the cells to reproduce the different tonal gradations of the original image.

The light that struck the carbon tissue would harden the resist or coating. The exposed carbon tissue is then physically transferred to the raw copper plated cylinder by a process referred to as lay down. The use of distilled water allows the gelatin surface of the carbon tissue to adhere to the copper. Using an alcohol solution, followed with the continuous flow of hot water, the paper backing is removed from the exposed and adhered carbon tissue.

The warm water dissolved the softer unexposed gelatin. When the development cycle was complete, the gelatin coating on the cylinder provided a variable thickness protective resist that

#### PRESS WORK AND FINISHING - I

allowed etching to proceed at different rates of speed. This would create ink-receptive cells etched to different depths. When the resist was ready and etching solution of ferric chloride was applied. If first reached the copper in the shadow areas, which are carried the thinnest resist. The shadow cells that began etching first, would etch the longest and deepest. The highlight cells began etching later, and would etch less.

Variable thickness protective resist is that allows providing at different rates of speed. This would create ink-receptive cells etched to different depths. When the resist is ready, an etching solution of ferric chloride is applied. This first reaches the copper in the shadow areas where the resist is thinnest. The shadow cells then begin etching first, would etch the longest and deepest. The highlight cells that begin etching later, would etch less.

Three diffusion transfer resists were used in the gravure industry. The first was the paper based carbon tissue which was later replaced by a more dimensionally stable film based carbon tissue and the third was a silver halide light sensitive film which was handled with and exposed in the dark room and then processed in an automated film processers.

## **Summary**

- Gravure printing is an example of intaglio printing. Gravure is direct printing process, like letterpress. The Gravure Printing is characteristically used for long run, high quality printing producing a sharp, fine image.
- Gravure is used mainly for large runs for magazines and directories on thinner paper. Some of the gravure printing applications include Printing Magazines, Flexible packaging, Giftwraps, Greeting cards, Labels, Cartons, Furniture laminations, Food Packagings, and others.
- Gravure printing is normally a reel-fed printing method although sheet-fed machines exist in small numbers. Most gravure presses are web-fed. There are several types of web presses used in gravure printing, including publication presses, packaging presses, product presses, label presses and folding carton presses.
- The rewinding units or separate machines are used gravure printing. Unwind roll supplies the substrate, which passes through the printing units, the rewind roll at delivery end of the machine ensures that the substrate is rewound as precisely as the unwind roll is procured by the supplier.
- Slitting and rewinding machines are available in different models to suit different requirements on a rewinding machine; attention must be concentrated on the printed roll.
- Solvent recovery is important because it is very costly. The purpose of a solvent recovery system is to remove evaporated solvents from dryer exhaust, air and the press room air and collect the solvent for reuse.
- Nature, use and maintenance of doctor blade is very important.
- Cutting the image on the cylinder can be done directly and by carbon tissue method.

## **Short Answer Type Questions**

- 1. State the principle of Gravure Printing?
- 2. Mention the Job suitability of Gravure Printing?
- 3. State the purpose of slitting machine?
- 4. What is the purpose of rewinding unit?
- 5. What is the purpose of solvent recovery?
- 6. State the purpose of Doctor Blade?
- 7. What is the Doctor Blade made up of?
- 8. Mention the maintenance of Doctor Blade?
- 9. What is direct transfer of image on gravure cylinder?
- 10. Explain Carbon tissue method of image transfer on gravure of cylinder?

## Long Answer Type Questions

- 1. Explain Gravure Printing Process and write about Gravure Presses
- 2. Explain in detail about Rewinding unit in Gravure presses?
- 3. Mention how Solvent recovery is done in Gravure printing presses.
- 4. Explain in detail the Nature, Use and Maintenance of a Doctor Blade?
- 5. What do you know about the construction of Gravure cylinder?
- 6. Write about direct and carbon tissue method of getting image on the gravure cylinder?

# UNIT 4

# **Print Finishing for Publication**

## Structure

- 4.1 Introduction
- 4.2 Binding Operations
- 4.3 Account Book Binding
- 4.4 Styles of Book Binding Publishers Binding
- 4.5 Equipment and machines used in binding
- 4.6 Materials Used for Binding
- 4.7 Automation in Binding

## **Learning Objectives**

After completion of this unit the student will be able to

- Give brief description of binding operations
- Styles of book binding
- Book repairing works
- Equipment and machines used in binding
- Materials used in binding
- Automation is binding

# **4.1 Introduction**

Book binding is the process of collecting printed pages of a book together in correct sequence, and putting them between covers. Binding holds the pages together, protects them from wear and tear and makes their use easy.

The first step of any binding process involves folding, gathering and sewing. Printing is done on large sheets of paper, several pages of the book printed on both sides of each sheet. After printing, the sheets are folded (folding). Each folded sheet comprising, usually 8 or 16 pages of the book is called a 'forme' or a 'section'. For the convenience of binder in arranging these sections in the correct sequence, the first page of each section is marked at the bottom left corner with consecutive numbers or letters of the alphabet, known as 'signatures'. These forme, or sections or signature are then arranged (gathering), ready for stitching (sewing), and after stitching, provided with appropriate covering.

# 4.2 Binding Operations

#### Counting

The sheets are counted out in lots by fanning off with the right hand, counting with the left thumb and holding each lot between the fingers of the left hand. The counted sheets are then laid down and the process is repeated until all are counted out and stacked.

All the work should be counted and examined as soon as they arrive from the machine department and before the plate is removed from the machine. This simple precaution will always save the make ready time on the machine. Again owing to the sheets being short or due to other faults- such as set-off, dirty sheets, wrong colours etc. become short of the required quantity. Counting beforehand prevents all this. These are electro-mechanical counting devices which operate on the corner of the paper stock. The control unit can count and tab in suitable numbers and the total number of sheets can be read on the control panel.

#### Collating

The collating of a book is the checking of all the sections, to see that they are all in the proper order and perfect in all other respects. It is an important operation and must be done. This is also known as 'Examining'. This is as follows:

The top right hand corner of the gathered sections of a book is held tightly in the right hand. The left hand thumb bends the sections downwards and releases the section one by one so that the sequence of the signatures may be quickly checked. New books are collated immediately before sewing. An important work or costly book should be examined after sewing in case of displacement of the sections.

#### **Tipping On**

This means a narrow edge of paste is applied to the back edge of a leaf, to fix it in position in the book. This is a very easy and cheap method. After tipping the book should be placed under a light weight until the paste is dry. The book should never be pressed as it would make the neat, straight line of paste to be squeezed out.

#### Perforating

It is the punching of series of small holes very close to each other so that a paper may be easily torn away. There is round hole, slot and slit method. For miscellaneous work and short runs, a bar perforator or treadle perforator with small round pins mounted in groups of units is worked vertically through a female punch bar. Several sheets can be fed at a time, but only one row of holes is punched at each descent of this pins. Both slot and round holes are done on rotary machines.

#### Punching

It is the making of one or more holes in the job, in an already settled position. Although there are hand-held and table-mounted devices, usually only floor-standing and foot operated or foot controlled power operated machines are used. In this the sheet is laid up to front and side lays and the treadle pressed. The punch bar is thus forced downwards carrying the male punches through the paper and into the female punch plate underneath. The number of sheets that can be punched depends upon the quality of the stock being punched and the power of the machine used. The number of sheets for a job can be calculated only after many trials. The main shapes and their uses are in figure. Any shape may be punched if the proper tool can be used.

The simplest machines have individual punches adjusted to different requirements. Thus the number and type of punches carried on the punch bar can be varied to suit the job. The machine is equipped with a multi-punch unit, to punch many holes in large quantities of sheets. Punches for multi-ring binders needing round holes or slot holes are example for multi-punch unit.

#### Drilling

Round holes are more quickly done by drilling than by punching. There are machines with one or more heads for drilling. The drills are hollow and the waste moves up through the drill and is thrown into a waste bin. Machines with movable side gauge have the paper moved on to them for each drilling position. Others have table shift mechanism where the whole table moves on to the new drilling point. A hand lever, a foot-operated treadle or a simple hydraulic machine can drive a rotating frill through a ream or more of paper at a time. Machines can control the speed of the electric motor that gives the rotational power to the drill. Paper drills with more heads drill more than one hole at the same time. Gauge bars are used for repeated work on a single head drill when many holes are drilled in paper going into a multi-ring binder or into a visible index ledger. If the rotational motor is not switched on, these machines can be used as punching machines. These machines can also do round- corner cutting into slotted and key hole shapes.

The drills are available in 2.5mm to 12.5mm diameters. The maximum amount of paper drilled at one time may be from 25 mm (1") for small diameters, to 60 mm (2.3") for larger diameters.

#### Guarding

It is pasting the back edge of a single plate to a narrow folded strip of paper or linen, and a single plate can be inserted in position and sawn with the rest of the section. The folded 'V shaped guards must be  $\frac{3}{4}$  to 1" in width. The sewing needle must pass through the guard while sewing. This is a strong method than tipping. The guards should be of thin material if there are many leaves to be treated; otherwise there will be excessive swelling in the back of the book. If the plates or insets are

stiff, linen guards must be used. The plates can have extra margin to form a hinge for a guard on the other side. This is called 'own guards'.

Points to remember when guarding;

- i) The outside pair of plates in a section is guarded inside.
- ii) The inside pair of plates are guarded outside.
- iii) Single plates outside a section must be guarded on outside.
- iv) Single plates within a section must be guarded on inside.

#### Numbering and Paging

Commercial books and forms are numbered in a particular sequence for easy reference. Simpler work and longer runs are numbered by a numbering box inserted in the printed forms to avoid a separate operation of numbering. In rotary printing machines there are special numbering heads.

Small quantity and miscellaneous work is numbered in the finishing department by a hand numbering machine. Similar office machines have six numbering wheels and their largest number is 999999.

Numbering machines number in the following sequence:

- i. Repeat (i.e., the same number appears at each operation)
- ii. Continuous (i.e., the addition of one number appears at each time)
- iii. Duplicate (two same numbers appear before moving on to the nest number)
- iv. Triplicate (i.e., three times the same number appears, before moving to the next number)
- v. Quadruplicate, quintuplicate and sixtruplicate (i.e., four times, five times and six times the same number appears before moving to the next number)

Letter prefixes can be printed before numbering. Some machines have space to add an inserted prefix. Commercial work is done by hand numbering machines for which accuracy can be maintained by visual means. They achieve high output. The inking and alteration of the figures are done automatically on all numbering machines.

Rotary numbering machines with one or more hollow cylinders, fitted with numbering machines are used for numbering sheets of printed forms. Ledgers and account books can be numbered during or after binding.

Account books and ledgers are numbered on the top left or right hand corners. If page one starts on a left hand page and page two on the right hand page (as 1,2,3,4....etc.,) it is said to be page numbered or 'paged'. If both sides of the opening are numbered identically (as 1, 1, 2, 2 same number for each opening of two pages) it is said to be 'folioed'. Some account books are thus 'folioed'.

To speed up production one or two numbering heads are mounted on a swivel (to turn round on a pin or neck). The book is laid on the table beneath and the numbering is impressed by pulling down the numbering heads by means of a handle and lever. This type of machine produces all the

numbering sequences, mentioned before. It can also 'skip' number (i.e., jump a number) as required. This is necessary when a book is 'paged' and the right hand side (rerso) half of the book. Treadle paging machines are also available to do the numbering work.

#### Signature

They are the letters or figures printed below the text at the foot of the first page of each section. Usually it appears on the left side tail margin. In the case of the page printed '8 up', such signatures would occur on pages 1,17,33,49 and so on. This is an important point to and W are usually omitted. There was no J or W in the Latin alphabet, and the use of V would be liable to confusion with the Roman numerals then used for page numbers. When the alphabet is exhausted and still there are sections requiring a signature, the usual method is to begin again with Bb, Cc, Dd, etc., or 2B, 2C, 2D, or again for very thick books 3B, 3C, 3D, etc. now the use of Arabic numerals is simpler and is gaining favour over the previous methods. To show an inset the signature is followed by asterisk (star mark), while a wraparound shows a dagger to indicate its position in the section. Other signatures at the bottom of the first page of a section may include an abbreviated title, volume number and catalogue number.

In some magazine work these signatures are printed close to the tail of the sheet and trimmed off without spoiling the quality of the typography. Signatures are necessary in gathered book work when the arrangement is complicated and when many volumes of the same size and appearance in section form, pass through the workshop at the same time.

The first section of the text is marked 'B' or '2'. The 'title section' or the 'preliminary matter' is signature 'A' or 'I'. The pages in the preliminary matter are numbered in roman figures. The subsignature may be found at the foot of the  $3^{rd}$  page of each section.

#### Hand Folding

The important operation of the warehouse is folding. It may be done by hand or by folding machine. A sheet is folded according to the agreed imposition, so that the printed pages appear in correct sequence. So schemes of imposition are planned in the composing or in DTP or stripping and art work in offset process, according to the requirements of the finishing department.

Folding is important because the appearance may be spoils by inaccurate folds causing uneven margins which cannot be rectified in subsequent operations.

Some work is 'folded to paper' and the tool needed is a 'folder'. Sheet are folded exactly in half, each time edge to edge with no special care to ensure that printed pages fall exactly one over the other.

Best work is 'folded to print. In which case the binder carefully observes that the printed matter 'registers' accurately one upon the other as the sheet is folded. This is done by bending the back part of the sheet over the print, until the edges of the printed pages can bending the back part of the sheet over the print, until the edges of the printed pages can be seen and placed exactly over one another before a fold is made.

This requires both precision and skill. The operator must understand the object (aim) and uses of signatures. Different methods are adopted for different forms of sheets, such as 4to, 8vo, 12mo and 16mo. The regular system may be gathered from the following of an 8vo sheet-the forme which is now much used.

# 4.3 Account Book Binding

#### **Account Book End Papers**

A special type of "made" endpaper is used for heavy account books. It is made up of the same paper as used in the book, the joint being of strong cloth or leather, and is sewn on.

The material required for each pair of endpapers is as follows:- two folded sheets of clean, plain paper similar to that used in the book itself; two sheets of paper which may consist of the ruler's waste sheets; two strips of leather or strong cloth for the joints, two inches wide and a little longer than the book itself; four pieces of marbled paper the size of sheet when folded.

The ends are made up in pairs and all material is laid to one edge, which is the head. The joint pieces are glued, one of the waste sheets is taken and laid along the glued joint, covering two-thirds its width, the blank sheets is taken and laid along the glued joint, covering two-thirds its width, the blank sheet laid over the other third and the folder used to assure that they stick well. The other endpaper is treated in a similar manner, or if more than one pair be required the whole is brought to this stage. The insides of the endpapers are now lined with marble paper, which should just cover the edge of the cloth or leather joint; thin glue should be used for this purpose. The ends have now to be folded and strengthened. A strip is linen is glued over the outside fold and, as it is not seen in the finished book, the colour is not important, provided it is not too dark. Just as the inside joint is wider one side than the other, this strengthener should be the same, and the narrow portions are placed nearest the book.

Other forms of endpapers are linings. The varieties of styles occurring in the cheaper forms of bindings in this branch of the trade are very numerous. The more general styles will be mentioned here, many of which are put on after the books is sewn.

A plain white end is used for ruled paper books in cheap bindings. Flush bindings may have the folded sheet pasted to the first leaf of the book, this should be pasted all over, not edged, as ruled books usually start page one on the left-hand side. Books with "squares" on where the material is turned in require an extra waste single leaf added to the outside of the endpaper. Marbled paper ends sometimes are used without a cloth joint and, as this paper is not strong enough by itself, it is used to line the whole of the inside opening after the book is sewn.

Manifold book employ a carbon paper to effect the extra copy which is of greasy nature and ready to stain. On account of this it is usually to make the back endpaper of such books of a greaseproof. The ends for this work may be edged on, or better, a pair of single leaves sewn round the first and last sections.

#### Taping

This is an operation whereby extra strength is given to important account books. Bindings of this class have to withstand daily wear and tear over a period of many months, and the object here is to reinforce those sections, such as those that occur at the beginning and at the end of the book, which from experience have been found to give way under strain. The number of sections affected depends upon the size of the book, usually six at each end, and operation consists in pasting strips of good quality white linen down the folds of certain leaves. As an example, a ten-quire demy book may be treated as follows:- Twelve section will be taped and for this purpose ten lengths of linen half-an-

inch wide, and two lengths one inch wide, will be required to be cut and laid down upon a pasted slab. The first section of the book will be taped on the outside by means of one of the wide strips, but three-quarters of the width should occur on the leaf that faces the cover of the book, leaving but a quarter of an inch for the other side. As linen will not stick to linen very well, the second section is taped up inside the fold of the outside sheet by means of one of the narrow strips, and the third section outside the fold and so on until six are completed. The back of the book is treated in a similar manner; in this case the wide strip occurs on the extreme outside.

The number of sections that it is advisable to tape must be governed by the quality of the binding, but at the same time it must be remembered that the swelling in the back is in creasing, and that after a certain number the advantages are doubtful.

#### Pressing

To assure the tightness of the sewing, the sections of best account books receive a thorough pressing at this stage. The "made" endpapers should be included in with the book and precautions taken that the whole is well knocked up and square, for should a section become displaced it will always tend to slip back in spite of the sewing. Any printing must be dry or it will set-off, and ink dries very slowly on hard-sized ledger paper. The pressing should extend over twelve hours.

#### Sewing

Sewing has already been described, therefore, it is only necessary here to mention those styles that apply to this branch of the trade. Account book sewing is a very important operation, for the books are large and durability is of the utmost importance. The materials should be of the best and selected with care.

The thread should be strong, bearing in mind the excess of swelling if too thick.

The tapes must be free from stretch. Vellum was used at one time, but the linen webbings now sold are better, as the glue adhere to them better and theory are not so hard as to cut the thread. The sewing itself resembles the library style sewing previously described, except that the kettle stitch is not sewn in and is made stronger. Instead of merely catching up the thread to the previous section, a loop is made at the commencement of the sewing and the threads securely tied to this, as illustrated. Attempts are sometimes made to increase the strength by sewing through the tapes instead of taking the needle round them, but the advantage is doubtful, for in this case it is not possible to pull the slips tight after any reduction in the swelling by hammering. A frame is not used with these sewings, as the stiff tapers do not require support, and their position on the back is not important, provided they are fairly equally distributed along the back. An even tension of the thread throughout is very important.

Machines of the heavier type are used for the cheaper styles of account book only, for they are unable to sew tight enough for heavy work.

Manifold books, etc. it has been mentioned that where these can be made up of single leaves, certain operations, such as perforating numbering, etc., and the assurance of correct register, are much simplified. The sewing of single leaves, however, presents difficulties. They may be oversewn, or if a good inch margin is allowed in the back at the time of printing and the thickness of the book does not exceed one inch, they may be stabbed or wire stitched through the side. Some wire-stitching

machines will penetrate an inch of paper, but failing this, holes are stabbed through the side by means of a booking or a stabbing machine and the book sewn through with thread.

## 4.4 Styles of Book - Binding - Publishers Binding

- 1. **Paper Wrappered:** it is a stitched or sewn pamphlet, to the back of which a thick cover paper is pasted. When saddle stitched, the cover and the sections are stitched in the same operation.
- 2. **Paper Covered:** It is a binding with a paper cover secured to the back of the book and to the endpapers.
- 3. **Paper wrappered and Overlapped:** It is a binding with a paper wrapper secured only to the back of a book. The wrapper is larger than the book and extends beyond the three edges.
- 4. **Paper Covered and Overlapped:** It is a binding with a paper secured to the back of the book and to the endpapers and extends beyond the three edges.
- 5. **Paper Wrappered and Turned Over:** It is a binding with a paper wrapper secured only to the back of the book and folded over the endpapers, coming flush with the edges.
- 6. **Cloth Cover or Cloth Limp:** A binding with a cloth or paper cover secured to the back of the book and to the endpapers.
- 7. **Cloth or Paper Stiffened:** A binding with a cloth or paper cover secured to the back of the book and stiffened on the sides with a pulp board kept between the cover (wrapper) and the endpaper.
- 8. **Quarter Bound and Cut Flush:** A book with the back of one material and the sides with another material, cut after the binding is done.
- 9. **Quarter Bound and Turned-in:** In this binding the backs are of one material and the remaining sides are of another material. They are turned-in after cutting the three sides of the book.
- 10. **Half Bound:** In this binding the back and corners of the book are of one material and the remaining sides are of another material, turned-in.
- 11. **Full (or whole) Bound:** In this the full cover used for the binding has a single piece of material.

### **Perfect Binding**

Perfect binding is often used, and gives a result similar to paperback books. National geographic is one example of this type. Paperback or soft cover books are also normally bound using perfect binding. They usually consist of various sections with a cover made from heavier paper, glued together at the spine with strong flexible glue. The sections are rough-cut in the back to make them absorb the hot glue. The other three sides are then face trimmed. This is what allows the magazine or paperback book to be opened. Mass market paperbacks (pulp paperbacks) are small (16 midsize), cheaply made and often fall apart after much handling or several years. Trade paperbacks are more sturdily made, usually larger, and more expensive.

#### **Book Repairing Work**

Hand bookbinders create new bindings that run the gamut from historical book structures made with traditional materials to modern structures made with 21<sup>st</sup> century materials, and from basic cloth- case bindings to valuable full-leather fine bindings. Repairs to existing books also encompass a broad range of techniques, from minimally invasive conservation of a historic book to the full restoration and rebinding of a text.

Though almost any existing book can be repaired to some extent, only books that were originally sewn can be rebound by renewing. Repairs or restorations are often done to emulate the style of the original binding. For new works, some publishers print unbound manuscripts which a binder can collate and bind, but often an existing commercially-bound book is pulled, or taken apart, in order to be given a new binding. Once the text block of the book has been pulled, it can be rebound in almost any structure; a modem suspense novel, for instance, could be rebound to look like a 16<sup>th</sup> - century manuscript. Bookbinders may bind several copies of the same text, giving each copy a unique appearance.

Conservation and restoration are practices intended to repair damage to an existing book. While they share methods, their goals differ. The goal of conservation is to slow the book's decay and restore it to a usable state while altering its physical properties as little as possible; the goal of restoration, however, is to return the book to a previous state as envisioned by the restorer, often imagined as the original state of the book. In either case, the modern standard for conservation and restoration is "reversibility". That is, any repair should be done in such a way that it can be un-done if and when a better technique is developed in the future. Bookbinders echo the physicians' creed, "First, do no harm" rebacking saving original spine, showing one volume finished and one untouched books requiring conservation treatment run the gamut from the very earliest of texts to books with modern bindings that have undergone heavy usage. For each book, the conservator must choose a course of treatment that takes into account the book's value, whether it comes from the binding, the text, the provenance, or some combination of the three. Many professional book and paper conservators in the United States are members of the American institute for Conservation of Historic and Artistic Works (AIC), whose guidelines, set forth in the AIC's code of Ethics, are generally considered to outline an appropriate approach to the treatment of rare or valuable materials.

In restoration hand binding, the pages and book covers are often hundreds of years old, and the handing of these pages has to be undertaken with great care and a delicate hand. The binding archival process can extend a book's life for many decades and is necessary to preserve books that sometimes are limited to a small handful of remaining copies worldwide.

The first step in saving and preserving a book is its deconstruction. The text needs to be separated from the covers and, only if necessary, the stitching removed; this is done as delicately as possible. All page restoration is done at this point, be it the removal of foxing, ink stains, page tears, etc. various techniques are employed to repair the various types of page damage that might have occurred during the life of the book. Geneva Bible, 1603, rebound in the style of Elizabeth I's bookbinder.

Master Bookbinders are qualified to undertake restoration and traditional hand binding, and use great care to make sure this process does not further damage the page. The pages are added as groups of page signatures, which when collated are beaten flat and pressed.

The preparation of the "foundation" of the book could mean the difference between a beautiful work of art and a useless stack of paper and leather.

The sections are then hand-sewn in the style of its period into book form.

The next step is the creation of the book cover; vegetable tanned leather, dyed with natural dyes, and hand-marbled paper can be used. Finally the cover is hand-tooled in gold leaf. The design of the book cover involves such hand-tooling, where an extremely thin layer of gold is applied to the cover. Such designs can be lettering, symbols, or floral designs, depending on the nature of any particular project.

# **4.5 Equipment and Machines**

Bookbinding trade uses a great variety of machines for mass production of books. The equipment and machines used are as follows:

- 1. Sewing frame: It has a flat wooden bed of 9" x 14" (225mm x 300mm) in front of it runs a slot connecting two uprights with a crossbar. This can be raised or lowered by wooden nuts on a screw thread out in the uprights. For sewing, the cords or tapes are fixed on the crossbar and secured in the slot by means of keys.
- 2. **Board Cutter:** A board cutter with a blade 24" long or more is used to cut straw boards. It leaves a rough edge in the case of heavy or thick boards.
- 3. **Standing press:** A standing press is very necessary to hold and press books, left to set and dry at various stages. They are in different sizes and forms.
- 4. **Nipping press:** It is very necessary for quick and even pressing. The sizes are 12" x 10" and 18" x 12"
- 5. **Plough Cutter:** It has two uprights connected by a wooden screw. It moves backward and forward along the two slides attached to the press. It was used in olden days for cutting the edges of the books.
- 6. Lying Press: This is the book-binder's main piece of apparatus. It has two large wooden cheeks and two screws. A press pin is used to tighten. The book is fixed in the press, with the back held tightly in position while it is backed, glued, back lining attached and left to set. Pairs of backing boards are required for this.
- 7. **Perforating Machine:** it has a set of pins in aow, whereby when the sheet is once fed into it and pressed, it gets perforated for easy tearing. This is treadle operated or power drives. There are two kinds: 1) Round hole perforators and 2) Rotary disc perforators.
- 8. **Stabbing Machine:** Holes are stabbed through the side (near the spine) equal distance and attached to a stabbing machine. Needles are readjusted to the size of the book.
- 9. **Punching Machine:** They are treadle-operated or power driven. They are set to punch round, slot, key shaped or any other type hole. The number of sheets punched at a time depends on the thickness of the paper; but not more than four to six sheets at a time.
- 10. **Numbering machine:** They are of the power, treadle, table or hand type. Each numbering head has four to six steel or gun-metal wheels with figures in relief. These can be adjusted

to number consecutively, alternately, in duplicate, in triplicate or in quadruplicate. It is used for account books and other counterfoil books.

- 11. **Ruling Machine:** These are used for making lines on ordinary exercise note book and account books. There are different patterns of ruling like Point and Margin, Faint and Common, Day book, Cash book or Single Ledger, Double cash Ledger, Treble Cash Ledger etc. There are two Kinds: 1) Pen ruling machine and 2) Disc ruling machine.
- 12. **Blocking Press:** There are many sizes of blocking presses for both power and hand operation. It is used for gold blocking or blind blocking on book cases. As it has open sides, large jobs can be blocked on the corners and edges by pulling the hand lever. It is of great value where large number of books is being produced to the same pattern. Twenty five to thirty cases a minute are done on an automatic blocking press.
- 13. **Cutting Machine:** It is very different to the plough cutter. Coming down with a diagonal motion, the knife is forced through the paper and leaves it again in two seconds. It can be operated by hand or power. The cutting pile should not be more than 3" in height.
- 14. **Folding Machine:** Folding machines are used to fold the paper into section on long runs. These machines are capable of folding 5000 sheets an hour. There are three varieties: 1) knife folding machine; 2) Buckle folding machine; 3) Combination folding machine.
- 15. **Bundling Machine:** When the sections are folded, the different sections are placed in a V shaped through and tightly squeezed between two heavy metal square heads. This pressing removes the air from between the leaves and allows the sections to lie flat. They should be tied up separately in bundles.
- 16. Wire Stitching Machine: In this machine, side as well as saddle wires stitching can be done. Wire stitching can be done to a book of thick and 16 to 28 gauge round wire can be used. Wire stitching machines are worked by treadle or by power. They have one or more number of stitching heads. There are two kinds; 1) Book wire stitcher and 2) Box wire stitcher.
- 17. **Thread looping and Stitching Machine:** These can effectively stitch pamphlets, and note books through the centre of the fold or through the side. They can stitch book up to thick. They are tie a reef knot, out the thread and pick up the end of the thread through them, tie a reef knot, out the thread and pick up the end of the thread again for the next booklet. The speed is about eight times the speed of hand work.
- 18. **Book sewing machine:** They are in several makes and in different sizes and are suitable for all letterpress and stationery work. Sewing can be done with two sheets on or ail-along, plain or through mull, or through tapes. The advantage of machine sewing is that it is five to six time quicker than hand sewn work. It is used for lot copies to be finished in less time.
- 19. **Case making machine:** The enormous demand for cheap cloth bindings has called for machinery for case making. Their output is about 500 cases per hour, which is four times the output of three people making cases by hand. In one machine the operator has to feed the machine with cloth, after which the gluing, placing of the boards and the hollow, the turning in of the material, etc. are automatic.

- 20. Three side Trimmers: There knife trimmers are used to cut three sides of the book in a single stroke in large publishers binderies. Three knife trimmers are used to speed book and pamphlet trimming for publication printers. These machines are operated by one or two persons and vary in book or pamphlet trim size form 4"x7" to 27"x32". Some three knife trimmers are designed for in line operation with binding equipment, while others are stand alone machines. With three-knife trimmers, two knives trim the top and bottom of the book or pamphlet at the same time. A clamp holds the books or pamphlets in a secure position while these cuts are made. Once the top and bottom ends are trimmers the trimming order is reversed, but the three sides are trimmed rapidly and accurately in either case.
- 21. **Gluing machines:** The all-important first gluing of the spine is now done by the Jackson gluier, a simple machine consisting of a rubber roller revolving in a tank of hot glue, and a scrubbing brush. Adjustable caterpillar tracks grip the sides of the books and carry them, spine down, first over the glue roller and then across the brush which rubs the glue between the sections.

#### 22. Bounding and Backing machine.

Smaller appliances which are most necessary are.

Folders : which are flat pieces of bone rounded at one end and pointed at the other.

- Shears or scissors with long blades.
- Small tendon saw.
- Glue pot.
- Pair of dividers.
- Pair of Lancashire wing compasses,
- Steel set square,
- French pairings knife
- Ordinary shoemaker's knife.
- Pair of band nippers.
- Pair of trindles
- Backing hammer.
- Several pairs of cutting boards.
- Bloodstone burnished for gilt edges.
- Gold cushion padded and covered with rough calf.
- Gold knife.

The equipment described is essential for 'forwarding' a book, a term including all the processes of binding from sewing to covering. Having been covered, the book is to be 'finished', that is, lettered and decorated with blind or gold tooling.

# 4.6 Materials Used for Binding

Different type of binding and finishing tools

Binding tools and equipment are the proper instruments or devices with which certain operation could be done conveniently and effectively. These have to be used carefully, so that they may not be damaged. In other words rough handling of these tools should be avoided.

Some of the following apparatus are absolutely necessary for a bookbinding section, for binding and finishing of goods:

- 1. **Folder:** This is made of bone of about 6" (150 mm) long. They are used for folding paper, rubbing down glue materials to make them stick and turning-in edges of books. Plastic and wooden folders are also available.
- 2. **Needles:** Book binder's needles or any needles with the eye large enough to take the thread conveniently for stitching or sewing of books.
- 3. Awl or Bodkin: These are used for making holes in strawboards and paper.
- 4. **Tenon Saw:** A small tenon saw for sawing-in the kettle stitch marks before sewing.
- 5. Knife: A good sharp pen knife is the best for cutting paper, calico etc.
- 6. **Paring knife:** Paring knife of different patterns is used for leather paring.
- 7. **Paring stone:** A plain marble stone or a lithographer's stone or a thick sheet of plate glass is used for paring the leather.
- 8. **Oil Stone:** A medium or fine stone 8" x 2" x 1" (200 x 50 x 25mm) with a can of good lubricating oil is essential for sharpening the edges of cutting tools.
- 9. **Brushes:** Brushes not less than 1" (25 mm) across are found to be useful for applying glue or paste quickly and evenly. After using them, soak the brushes in water, otherwise the bristles will come off.
- 10. **Scissors:** A good pair of scissors of 9" (225 mm) is used for trimming paper, calico, leather, etc.
- 11. Hammer: Bookbinder's hammer with a large rounded face and with a cross pane is best.
- 12. **Straight edge:** one of polished wood 15" (375 mm) long with a metal edge is the best one. It is used as a guide to cut clean, straight edges on paper, board and calico.
- 13. **Try square:** A 6" (150 mm) square are used by the binder for marking the back of the sections before sewing.
- 14. **Spring Dividers:** The 6" spring dividers have a screw adjustment and are useful for measurement.
- 15. **Knocking-down iron:** A flat iron of about 8" x 4" (200 x 100mm) will be useful while knocking down the block of a book.

- 16. **Backing Boards:** wedge shaped wooden boards 8", 10", 15" (200 250 375mm) long, with the top edges sloped at an angle of 80 degrees are used for making grooves at the back of the book.
- 17. **Pressing boards:** Boards made of plywood of 12" x 10", (300 x 250 mm) 11" x 7" (275 x 175 mm) are used to press the books or sheets in the nipping, screw or standing presses.
- 18. **Glue kettle:** A glue pot with a water-bath is required. The water-bath is essential to avoid burning the glue.
- 19. **Pliers:** A kind of small pinchers with long jaws, used for bending or cutting metal wires in a wire-stitching machine.
- 20. Punch: A tool, usually of steel of various shapes for perforating holes in boards and papers.
- 21. **Chisel:** A tool with a cutting edge on one end of a metal blade used when making slot holes in the straw boards.
- 22. **Wing compass:** A metal instrument having two pointed legs joined at the top, used for measuring on rough wood, strawboard and paper.
- 23. **Strop:** It is a piece of plywood 15" x 2" with a strip of 12" leather glued to one side and a strip of 12" emery cloth glued to the other side. It is used for sharpening knives.
- 24. Paste vessels: These are the containers for holding paste.

# **4.7** Automation in Binding

Now a day's all operations in binding is done by machines and equipment The following are the machines in binding are the an format.

- Cutting machine
- Board cutter
- Ruling machine
  - 1. Disk rule
  - 2. Pen rule

#### **Folding machine**

- 1. Buckle fold
- 2. Knife fold

### Lamination

- 1. Wet lamination
- 2. Dry lamination

## Card box punching machine

## Wire stitching machine

- 1. Side stitching
- 2. Soled stitching
- Envelop Perpetrating machine
- Spiral punch machine
- Nipping press machine
- Hard press machine
- Dry stamping machine
- Punching machine
- Suring machine

## Summary

- Bookbinding is the process of collecting printed pages of a book together in correct sequence, and putting them between covers.
- The binding operations include counting, collating, tipping on, perforating, punching, drilling, guarding, numbering and paging, signature and folding, taping, pressing, sewing, etc.
- Styles of binding include publishers binding, perfect binding etc.
- Book repairing work is done with a good range of techniques for conservation.
- Equipments and machines used in binding me saving frame, board cutter, standing press, nipping press, plough cutter, lying press, perforating machine, staffing machine, numbering machine, ruling machine, blocking press, cutting press, folding machine, bundling machine, wire stitching machine, books sewing machine, case making machine, three side trimmers etc.
- Many materials are used in binding like folder, needles, bodkin, tenon saw, knife, paring knife, paring stone.
- Automation in binding is done by machines and equipments.

## **Short Answer Type Questions**

- 1. What is Book Binding?
- 2. What is collating?
- 3. Explain perforating?
- 4. Brief mention about punching?
- 5. State about guarding?
- 6. What is signature?
- 7. Explain taping?
- 8. Mention about pressing?
- 9. What is perfect binding?
- 10. Explain tipping on?
- 11. State the purpose of drilling?

## Long Answer Type Questions

- 1. Explain the various binding operations that is carried out in binding section?
- 2. What do you know about account book end papers? Explain?
- 3. Mention about the styles of book binding? Explain about each one of them?
- 4. How is book repairing work done? Explain in sequence?
- 5. List out the machines and equipments used in binding section?
- 6. State the different types of materials used in binding?
- 7. What do you know about automation in binding? Explain about them?

# **PRINTING TECHNOLOGY**

# Paper - III

# INTRODUCTION TO COMPUTER SYSTEM

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#### **Introduction to Computer System**

#### **Structure:**

- 1.1 Introduction
- 1.2 Various Components of a Computer System and their functions.
- 1.3 Difference between Hardware and Software
- 1.4 Configuration of Computer System
- 1.5 Peripherals
- 1.6 Opening an application program
- 1.7 Creating a Folder

#### **Learning Objectives:**

On Completion of this unit the learner will be able to:

- Know Various components of a computer system
- Differences between hardware and software
- Function of each component of a computer system
- Configuration of a computer system
- Various peripherals
- Opening and application program
- Creating a folder in specified location

#### **1.1 Introduction:**

The computer is an electronic device which can receive information (data) in a form and

of performing a sequence of operations in accordance with a predetermined but variable set of procedural instructions (program) to produce a result in the form of information or signals.

It can store, retrieve and process data. You can use computer to type documents, sends email, and browse internet. It can handle spreadsheets, accounting, database management System, Presentations, games and more...

The first ENIAC- Electronic Numerical Integrator and Computer) was amongst the



earliest electronic general-purpose computers made. It was Turing-complete, digital and able to solve "a large class of numerical problems" through reprogramming. Although ENIAC was designed and primarily used to calculate artillery firing tables for the United States Army's Ballistic Research Laboratory, its first programs included a study of the feasibility of the thermonuclear weapon.

ENIAC was formally dedicated at the University of Pennsylvania on February 15, 1946 and was heralded as a "Giant Brain" by the press. It had a speed on the order of one thousand times faster than that of electro-mechanical machines; this computational power, coupled with general-purpose programmability, excited scientists and industrialists alike. This combination of speed and programmability allowed for thousands more calculations for problems, as ENIAC calculated a trajectory that took a human 20 hours in 30 seconds.

Computer hardware -are the physical parts or components of a computer, such as the monitor, keyboard, computer data storage, graphic card, sound card and motherboard.

Computer software- or simply software, is a part of a computer system that consists of data or computer instructions, in contrast to the physical hardware from which the system is built.

1.2 Various Components of a Computer System and their Functions:

Every Computer consists of the following basic components as given below:

1.1 Computer case- Where all the components are stored

#### INTRODUCTION TO COMPUTER SYSTEM



d) Motherboard

e) Power Supply

f) Hard Disk Drive (HDD)



g) Floppy Drive

CD Drive

DVD Drive







h) Video Card

k) Mouse

i) Monitor



JIIIOI



b) CPU- CPU (pronounced as separate letters) is the abbreviation for central processing

unit. It is the brain of the computer

 c) RAM- Random-access memory is a form of computer data storage that stores data currently being used. A random-access memory device allows





data items to be read or written in

almost the same amount of time for any of the physical location of data inside the memory.

- d) Motherboard- A motherboard (sometimes alternatively known as the mainboard, system board, baseboard, planar board or logic board
- e) Power Supply- A switched-mode power supply (SMPS) is an electronic circuit that converts power using switching devices that are turned on and off at high frequencies, and storage components such as inductors or capacitors to supply power when the switching device is in its non-conduction state.
- f) HDD- A hard disk drive (HDD), hard disk, hard drive or fixed disk is a data storage device that uses magnetic storage to store and retrieve digital information using one or more rigid rapidly rotating disks (platters) coated with magnetic material.
- g) Disk Drives- a device which allows a computer to read from and write on to computer disks. Example: Floppy Drive, CD, DVD

- h) Video Card- A video card (also called a display card, graphics card, display adapter or graphics adapter) is an expansion card which generates a feed of output images to a display (such as a computer monitor).
- i) Computer Monitor- A computer monitor is an output device which displays information in pictorial form. A monitor usually comprises the display device, circuitry, casing, and power supply.
- j) Keyboard- It is a typewriter-style device which uses an arrangement of buttons or keys to act as a mechanical lever or electronic switch.
- k) Mouse- A computer mouse is a hand-held pointing device that detects two-dimensional motion relative to a surface. This motion is typically translated into the motion of a pointer on a display, which allows a smooth control of the graphical user interface.

1.3 Differences between Hardware and Software

Computer software, or simply software, is a part of a computer system that consists of data or computer instructions, in contrast to the physical hardware from which the system is built. Computer hardware are the physical parts or components of a computer, such as the monitor, keyboard, computer data storage, graphic card, sound card and motherboard. By contrast, software is instructions that can be stored and ran by hardware.

The following are the differences between Computer Software and Computer Hardware.

Software	Hardware	
A set of instructions given to the computer is	Physical parts of the computer are called	
called software.	hardware.	
You cannot touch and feel software. Software is developed by writing instructions in programming language.	You can touch, see and feel hardware.	
The operations of computer are controlled through software.	Hardware is constructed using physical materials or components.	
If software is damaged or corrupted, its backup copy can be reinstalled.	Computer is hardware, which operates under the control of a software.	
Software is affected by computer viruses.	If hardware is damaged, it is replaced with new one.	
Software can be transferred from one place to another electronically through network.	Hardware is not affected by computer viruses.	
User can make many new duplicate copies of the software.	Hardware cannot be transferred from one place to another electronically through network.	
	User cannot make new duplicate copies of the hardware.	

### 1.4 Configuration of a Computer System:

In communications or computer systems, a configuration is an arrangement of functional units according to their nature, number, and chief characteristics. Often, configuration pertains to the choice of hardware, software, firmware, and documentation. The configuration affects system function and performance.

It is divided into two parts:

- Input devices
- Output devices

1.4.1 Major Components of a Computer System are:

- 1. Central Processing Unit (CPU)
  - a. Motherboard

- b. Processor
- c. RAM
- d. CMOS Battery
- e. Hard Disk Drive (HDD)
- f. CD/ DVD Drive
- 2. Keyboard, Mouse Speakers
- 3. Monitor
- 4. Modem
- 5. Web Cam
- 6. Printer, Scanner

1.4.2 There two ways to know the system configuration

- 1. Through Windows
- 2. Through BIOS (Basic Input Output System)
- 1.4.2.1 Through Windows
- a) Select My Computer Icon on the Desktop
- b) Right Click to see the Properties as shown below

System Properties ?							
System Restor	re Autom	atic Updates	Remote				
General	Computer Name	Hardware	Advanced				
System: Microsoft Windows XP Professional Version 2002 Service Pack 3Registered to: Trisha TrishTech.comMD Sempron(tm) Processor LE-1250 2.11 GHz, 1.93 GB of RAM Physical Address Extension							
	OI	Cancel	Apply				

- 1.4.2.2 Through BIOS
- a) Switch Off the computer and restart
- b) Keep pressing F2 / Del Key from the Keyboard to appear the BIOS Screen
- c) See all the Configuration and do the necessary modifications then exit by pressing F10

The screen as shown below:


1.5 Peripherals: A peripheral device is defined as a computer device, such as a keyboard or printer, that is not part of the essential computer (i.e., the memory and microprocessor). These auxiliary devices are intended to be connected to the computer and used.

The Common Peripherals are:

- Storage
- Input: Input Devices
- Output: Output Devices

The Computer Storage: Computer data storage, often called storage or memory, is a technology consisting of computer components and recording media that are used to retain digital data. It is a core function and fundamental component of computers.

Input: An input device is any hardware device that sends data to a computer, allowing you to interact with and control it.

Output: An output device is any device used to send data from a computer to another device or user. Most computer data output that is meant for humans is in the form of audio or video. Thus, most output devices used by humans are in these categories. Examples include monitors, projectors, speakers, headphones and printers.

#### PAPER III

# 1.6 Opening an Application Program:

To open a program using the Start menu:

- 1. Click Start.
- 2. Click All Programs and slide your mouse pointer until you've selected the program you want to open (it turns blue).
- 3. Click to open the program you've selected. (Remember, programs with small black arrows beside them will open another cascading menu. Simply drag your mouse pointer to make your selection.)
- 4. To close a program, click the located at the top-right of the window.

Sam	🖬 Accessories		Accessibility
	🛅 Adobe	•	🛅 Communications
Internet	🛅 Adobe Acrobat	•	🛅 Entertainment
	Applications	•	🛅 Multimedia
Microsoft Outlook	🛅 Aureal Vortex	•	🛅 System Tools
	🛅 CAM UnZip	•	💴 Address Book
MSN Explorer	🛅 DivX ;-) MPEG-4 Video Codec	•	📓 Calculator
(3)	🛅 DSMO VPN Client	≁	💽 Command Prompl
Windows Movie Make	🛅 Dune	•	📕 Notepad
S Windows Media Playe	🛅 Games	•	🦉 Paint
	🛅 HP CD Labeler II	•	🥑 Program Compati
G Tour Windows XP	🛅 HP CD-Writer	•	🥘 Synchronize
Set law r	🛅 Internet Explorer	•	🛞 Tour Windows XF
Wizard	🛅 iVasion	•	🔯 Windows Explore
Tar	🛅 Jasc Software	•	🚳 🛯 Windows Movie N
Microsoft Word	🛅 Java 2 Runtime Environment	•	📝 WordPad 📐
N	🛅 Java Web Start	•	🛅 Virgin Games 😗
All Programs 👂	📾 Lexmark FontVision	•	i VistaScan

Launching Internet Explorer from the Start menu

Internet, another choice on the Start menu, opens Internet Explorer; the web browser that comes bundled with Windows XP.

To launch Internet Explorer from the Start menu:

- 1. Click Start.
- 2. Choose Internet.
- 3. Click to open Internet Explorer.

4. To close a program, click the located at the top-right of the window.



Note: You must be connected to the Internet for Internet Explorer to open a webpage.

Launching Microsoft Outlook Express from the Start menu

Email, another choice on the Start menu, opens Microsoft Outlook Express, the email client that comes bundled with Windows XP.

To launch Outlook Express from the Start menu:

- 1. Click Start.
- 2. Choose Email.
- 3. Click to open Microsoft Outlook Express.
- 4. To close Outlook Express, click the located at the top-right of the window.



## 1.7 Creating a New Folder:

Folders are the basic organizational building blocks of any computer system. Without folders it would be virtually impossible to keep track of all the files that are found on even the smallest system. New folders can be created just about anywhere, but three methods are shown below.

New Folder on Desktop - Right click anywhere on an open area of the desktop. Select New and then click Folder. A new folder with the default name New Folder will be created on the desktop. Either accept the default name New Folder (bad idea) by hitting the enter key or type a new name for the folder (good idea) and then hit enter on the keyboard.



New Folder Using Windows Explorer in Hierarchical View - There are two easy methods for creating a new folder in this view.

• On the Menu bar select File > New > Folder and the folder will be created in the righthand pane. The trick is to make sure that prior to making the selections from the Menu that you are located at the proper place in the hierarchical view in the left pane. The new folder will always be created as a subfolder of whatever location you have selected.

😂 Local Disk (C:)	
File Edit View	Favorites Tools Help
New 🕨	🛅 <u>F</u> older
Create Shortcut	<u> </u>
Delete Rename Properties Local Disk (C:) Close Close Local Disk ( DVD Drive of File Edit View	Briefcase Bitmap Image Wordpad Document Rich Text Document Text Document Wave Sound Compressed (zipped) Folder Favorites Tools Help Search
Address Se Cit	
Folders	× Name 🔺
<ul> <li>Desktop</li> <li>My Documents</li> <li>My Computer</li> <li>My Computer</li></ul>	(A:) C:) WINDOWS C:) Mew Folder M

New Folder Using Windows Explorer in Task View

• Once again, make sure you're in the location where the new folder is to be created. In this case I'm using the same location that was used in the previous example; the root of the C drive as shown in the Address bar. In the File and Folder Tasks section, click the Make a New Folder selection. The New Folder is created in the right-hand pane as shown in the second screen capture. Note that the File and Folder Tasks section also expands to include new entries relative to what can be done with the folder just created.

#### PAPER III



## **Summary:**

A computer is having an acquainted with Microsoft Windows in the earlier classes of study the advanced features of windows and their utilities in relation to the study of Information Technology are discussed in this unit.

# **Short Answer Type Questions:**

- 1. What are the various components of Computer Vision?
- 2. Define Hardware?
- 3. Define Software?

# Long Answer Type Questions:

- 1. List out the difference between hardware and software
- 2. Explain in detail the functions of each components of computer system?

## 2. ADVNACE WINDOWS FEATURES

## Structure:

- 1. Introduction
- 2. Disk Format
- 3. Installing new software using Control panel
- 4. Uninstalling software using Control Panel
- 5. Installing Hardware using Control Panel
- 6. To find out drive space using tools options of Accessories Group
- 7. Defragmenting the disk
- 8. Installing procedure of a Modem using Control Panel
- 9. Installing a Printer using Control Panel
- 10. System Date/Time
- 11. Display Properties

## **Learning Objectives:**

On completion of this unit the learner will be able to:

- Format Floppy disk using Explore Options
- Install a new software using Control Panel
- Uninstall a software using Control panel
- Install a new Hardware using Control panel
- Find out disk space using System Tools Option
- Defragmenting the disk using System tools option
- Install a Modem using Control panel
- Install a Printer using Control panel

- Change the resolution, color, appearance and screen saver of the display
- Change System Date and Time

## 2.1 Installing a new software using Control Panel:

Before you can use a program, you must first install it on your computer. Most programs come packaged in a CD or DVD and will automatically launch an install routine when you insert this media on your computer. If the installer does not automatically launch, open the CD or DVD in My Computer and look for a file named setup. When you click on the setup file, your program's installation routine will begin. In some cases, you can get a cheaper version of a program if you choose to purchase it from an online store, in which case you only must download the installer from a website to your hard drive and double-click on it to start the installation routine for that program. Many programs have their own uninstall routine which will remove the files that make up that program from your computer.

To manage the installed programs on your computer you will often use the Add/Remove Programs applet in the Control Panel (Start, Control Panel, Add/Remove Programs).



You will rarely use this applet to add programs to your computer because most programs have their own installer. However, you will use this applet a lot to remove programs or change how they are installed. For example, if you have Microsoft Office installed on your computer you have a whole suite of programs installed. Microsoft Office includes individual programs for word processing, spreadsheets, presentations, databases, and email. If you want to completely uninstall Microsoft Office, click on the Remove button. If you only want to remove an individual Office program that you will not be using, click on Microsoft Office on the list displayed when you open the Add/Remove Programs applet, then click on the Change button.

Currently installed programs: 📃 Show upgates	Sort by:	Name		×
By macromodal maximayor or nagin		3128	1.3200	
🔗 Macromedia FreeHand 10		Size	36.08MB	
B Macromedia Shockwave Player				
HCAfee VirusScan Enterprise		Size	10.36MB	
Microsoft .NET Framework 2.0		Size	88.44MB	
Microsoft Office XP Media Content		Size	87.99MB	
Microsoft Office XP Professional		Size	212.00MB	
Click here for support information.		Used	frequently	
	Last Us	ed On	3/2/2006	
To change this program or remove it from your computer, click Change or Remove.	a	hange	Remove	
die de la constant de la				

This will open another window where you can select to remove the whole suite or just change which programs are installed.

Microsoft Offi Maintenance	Mode Options
<b>1</b>	Add or Remove Features - Change which features are installed or remove specific features.
<b>i</b>	Repair Office - Restore your Microsoft Office XP Professional     installation to its original state.
	O Uninstall Office - Remove Microsoft Office XP Professional from this computer.
Help	<back next=""> Cancel</back>

The steps for removing the program will vary for each program you have installed. Many programs share some files, and they may ask you during the uninstall process if you want to remove those shared files. Even though it will waste some disk space, it is often safer to just say yes when prompted and leave these shared files on your hard drive, in case they are needed by the system or by another program.

2.2 Uninstalling Software using Control Panel:

Adding software is usually done with the installation disk or executable, while adding Windows components can be done within the "Add and Remove Programs" utility. To change or remove a program in Windows XP, you must either use the "uninstall" utility bundled with the program

you wish to remove, or more often, use the "Add and Remove Programs" option in the Windows XP control panel. DO NOT delete folders under your C: drive to remove an unwanted programthis can cause serious problems with your operating system, often leading to full operating system reinstalls.

How to Remove Programs

- 1. Click on the "Start" button, located in the lower left corner of your screen.
- 2. Click on "Control Panel" to access control panel options.
- 3. The system may warn you that changing these options may negatively affect your system. Ignore this warning and proceed.
- 4. Open the "Add and Remove Programs" utility. After a moment or two (it may take a second), you'll be provided with a list of programs.
- 5. Locate the program you wish to remove. You can sort the results by clicking on "sort by".
- 6. At this point, you can either change the program or remove it. To change the program, click Change/Remove or Change. To entirely remove it, click Change/Remove or Remove.
- 7. It is possible that you'll receive no further notification of the action from Windows, or it may start a third-party program to assist with removal developed by the software manufacturer.

👪 Add or Rei	move Programs		
	Currently installed programs and updates:	Sort by: Name	*
C <u>h</u> ange or Remove	20040401WinFormsMH	Size	<u>40.20MB</u>
Programs	Click here for support information.	Used y	occasionally
Add New	To change this program or remove it from your computer, click Change or Remove.	Last Used On Change	4/23/2004
Programs	ACDSee 32	Size	2.54MB
E.	Kara Adobe Acrobat - Reader 6.0.2 Update	Size	5.66MB
Add/Damaus	Marco Atmosphere Player for Acrobat and Adobe Reader		
	Adobe InDesign 1.5	Size	50.60MB
Components	Adobe Photoshop 5.5	Size	87.58MB
	Adobe Photoshop Album 2.0 Starter Edition	Size	15.38MB
Set Pr <u>o</u> gram	Adobe Reader 6.0.1	Size	43.91MB
Access and Defaults	🔂 Commandos 3 - Destination Berlin	Size	1.26MB
	Cool Ruler	Size	0.56MB
	Diablo II	Size	1,776.00MB
	🔀 GLOBEtrotter FLEXid Drivers	Size	4.45MB
	🔀 Greeting Card Creator 32	Size	23.59MB
	🔀 HighMAT Extension to Microsoft Windows XP CD Writing Wizard	Size	2.15MB
	III HP Photo and Imaging 1.0 - Scanjet 3500c Series	Size	1,090.00MB 👱

to

Things

remember:

- The Windows Add and Remove Programs utility will only remove programs made to run in Windows. If you have other types of programs, you may need to check the software documentation for further instructions.
- If you have games saves or other data tied to the program you're removing, you may want to store those separately if you intend to keep them. Some uninstallers will ask you if you'd like to save them, others will not ask and delete everything.

How to Add/Remove Windows Components

To add or remove Windows components, you must be an administrator on your computer.

- 1. Click on the "Start" button, located in the lower left corner of your screen.
- 2. Click on "Control Panel" to access control panel options.
- 3. The system may warn you that changing these options may negatively affect your system. Ignore this warning and proceed.
- 4. Open the "Add and Remove Programs" utility. After a moment or two (it may take a second), you'll be provided with a list of programs.
- 5. Click Add/Remove Windows Components.
- 6. Follow the instructions in the Windows Component Wizard.

To add or remove a component, click the checkbox. A shaded box m	
part of the component will be installed. To see what's included in a co Details.	neans that only omponent, click
Components:	
🗹 📻 Accessories and Utilities	18.0 MB 🔼
✓	3.8 MB 📃
🗹 🧊 Indexing Service	0.0 MB
🗹 🧑 Internet Explorer	0.0 MB
Represent and Monitoring Tools	2 N MB 🔛
Description: Includes Windows Accessories and Utilities for your com Total disk space required: 0.0 MB	nputer.

# Things

to

- If an item is checked in the Windows Component Wizard, it's already installed.
- If you installed Windows components but did not configure them at installation, there will be a list -- click configure and follow the instructions.

# 2.3 Installing Hardware Using Control Panel:

Adding a printer to your computer involves two steps: making the connection from the computer to the printer using either a parallel or USB cable, and installing the software needed to allow your computer to communicate with the specific printer you want to use.

Most printers sold today support USB, which can transfer data much faster than the older parallel connector. If you have an older printer, you may only have the parallel connector as a connection option.

# http://etc.usf.edu/te\_win/i/cnctprnt.gif

The first step to adding a printer is to make sure the cables are securely connected on both ends (computer and printer).

Once you have physically connected the printer, you will also need to install the software needed to allow the computer to send print jobs to it. This software is often supplied on a disk by the printer's manufacturer, but most printers will work with the drivers supplied with Windows XP. The driver software provided by the manufacturer may add extra features, such as giving you information about the ink levels.

To install a new printer with Windows XP's, Add Printer Wizard, follow these steps:

1. Click the Start button on the Windows taskbar and then click Control Panel on the right side of the Start menu.

2. Click the Printers and Other Hardware hyperlink if the Control Panel window is in Category View. Otherwise, double-click the Printers and Faxes icon if the Control Panel window is in Classic View.



3. Click on the Add a Printer hyperlink in the Printers and Other Hardware window to start the Add Printer Wizard and then click the Next button or press Enter to advance to the Local Printer or Printer Connection dialog box. If you are in Classic View, start the wizard by clicking on the Add a Printer option on the left, under Printer Tasks.





4. Make sure that the Add Printer Wizard selects the Local Printer radio button, and that the Automatically Detect and Install my Plug and Play Printer check box beneath this radio button is also selected before you click the Next button.

Add Printer Wizard
Local or Network Printer The wizard needs to know which type of printer to set up.
Select the option that describes the printer you want to use:
<ul> <li>Local printer attached to this computer</li> </ul>
Automatically detect and install my Plug and Play printer
A network printer, or a printer attached to another computer
To set up a network printer that is not attached to a print server, use the "Local printer" option.
< Back Next > Cancel

5. If the wizard is unable to detect your printer in the New Printer Detection dialog box, click Next to install the printer manually.

6. Select the port for the printer to use in the Use the Following Port drop-down menu in the Select a Printer Port dialog box and then click the Next button. You should select either LPT1 (if you are connecting your printer using a parallel connector) or USB.

dd Printer Wizard
Select a Printer Port Computers communicate with printers through ports.
Select the port you want your printer to use. If the port is not listed, you can create a new port.
Use the following port: LPT1: (Recommended Printer Port)
Note: Most computers use the LPT1: port to communicate with a local printer. The connector for this port should look something like this:
Create a new port:
< Back Next > Cancel

7. Click the manufacturer and the model of the printer in the Manufacturers and Printers list boxes, respectively. If you have a disk with the software for the printer, put it into your floppy or CD-ROM drive and then click the Have Disk button: Select the drive that contains this disk in the Copy Manufacturer's Files drop-down menu and then click OK.

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Select the manufac disk, click Have Di	urer and model of your printer. If your c. If your printer is not listed, consult ;	r printer came with an installation your printer documentation for
compatible printer s	ftware.	
Manufacturer	Printers	
Agfa Alps Apollo	AGFA-AccuSet v52.3	3
Apple		

8. Click the Next button to advance to the Name Your Printer dialog box. If you want, edit the name for the printer in the Printer Name text box. If you want to make the printer that you're installing the default printer that is automatically used whenever you print from Windows or from within a Windows program, leave the Yes radio button selected beneath the heading, do you want your Windows-based programs to use this printer as the default printer?

Name Your Printer You must assign a name to this	: printer.
Type a name for this printer. Be name combinations of more tha possible.	cause some programs do not support printer and server in 31 characters, it is best to keep the name as short as
Printer name:	
AGFA-AccuSet v52.3	
	as the default printer?
Do you want to use this printer	as the deraut plinter :
Ooyou want touse this printer ⊙ Yes ◯ No	as the derault plinter :
Doyou want touse this printer ⊙Yes ○No	as the derault plinter :
Doyou want touse this printer ⊙Yes ○No	as the derault plinter :

9. Click the Next button to advance to the Printer Sharing dialog box. If you want to share this printer with other users on the network, click the Share Name radio button and then, if you want, edit the share name that the wizard gives the printer in the Share Name text box (this is the name that the other users on the network will see when they go to select this printer for printing their documents).

You can share thi	is printer with other network users.
If you want to sha suggested name o	re this printer, you must provide a share name. You can use the or type a new one. The share name will be visible to other network
<ul> <li>Do not share the share</li></ul>	his printer
O Share name:	

10. Click the Next button to advance to the Print Test Page dialog box. To print a test page from your newly installed printer, make sure the Yes radio button is selected in this dialog box.

Add Printer Wizard
Print Test Page To confirm that the printer is installed properly, you can print a test page.
Do you want to print a test page?
⊙Yes
◯ No
< Back Next > Cancel

11. Click the Next button to advance to the Completing the Add Printer Wizard dialog box, where you can review the settings for your new printer before you click the Finish button or press Enter to finish installing the new printer.

Add Printer Wizard				
	Completing the Add Printer Wizard			
	You specified	You have successfully completed the Add Printer Wizard. You specified the following printer settings:		
	Name: AGFA-AccuSet v52.3			
	Share name: <not shared=""></not>			
1. J.	Port: LPT1:			
	Model:	Model: AGFA-AccuSet v52.3		
	Default	Yes		
	Test page:	Yes		
		67 (G. 1975).2010.00		
To close this wizard, click Finish.				
		< Back Finish Cancel		

2.4 Uninstalling a hardware using Control panel:

It's important to perform some basic maintenance from time to time to keep Windows XP running smoothly. Luckily, Windows XP provides you with some basic tools to make the maintenance process as painless as possible. You can access these tools via the System Tools menu.

To open the System Tools menu:

- 1. Choose Start  $\rightarrow$  All Programs  $\rightarrow$  Accessories  $\rightarrow$  System Tools.
- 2. A cascading System Tools menu opens.



#### Disk Defragmenter

All Windows XP computers have at least one hard disk. The hard disk acts as your computer's storage area. Almost everything installed on your computer—applications, files, folders, and the operating system—is stored here.

With general use (creating new files, deleting files, or installing new software), your hard disk can become fragmented. This means parts of the same disk file become scattered over different areas of the disk. A fragmented hard disk slows down your computer and hinders its performance.

To keep your hard disk running smoothly, you must routinely defragment, or "defrag" the hard disk. The Disk Defragmenter tool can help you do this.

To use Disk Defragmenter:

- 1. Choose Start → All Programs → Accessories → System Tools → Disk Defragmenter.
- 2. The Disk Defragmenter opens.

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#### INTRODUCTION TO COMPUTER SYSTEM

😵 Disk Defragment	er				
File Action View	Help				
← →   🖬   😫					
Volume	Session Status	File System	Capacity	Free Space	% Free Space
🚍 (C:)		FAT32	7.83 GB	664 MB	8%
Estimated disk usage	before defragmentation:		-	-	
Estimated disk usage	alter defragmentation:				
Analyze	Defragment Pa	use Stop	View Rep	iort	
Fragmented files	Contiguous files	Unmovable files	Free space		

To open Microsoft Management Console:

- 1. Open Disk Defragmenter.
- 2. Open the Action menu.
- 3. Click Help.
- 4. A Microsoft Management Console opens and explains how to run Disk Defragmenter.

😵 Microsoft Management Console	
ਸੂੰ≣ ← ⊏> ம்ரு Hide Back Forward <u>O</u> ptions	
<u>Contents</u> I <u>n</u> dex <u>S</u> earch Microsoft Management Console → Disk Defragmenter	<ul> <li>Disk Defragmenter</li> <li>Disk Defragmenter is a system utility for analyzing local volumes and locating and consolidating fragmented files and folders. You can also <u>defragment</u> disks from a command line using the <b>defrag</b> command.</li> <li>Before defragmenting files or folders, see <u>Checklist:</u> <u>Defragmenting volumes</u>.</li> <li>For tips about using Disk <u>Defragmenter</u>, see <u>Best</u> <u>practices</u>.</li> <li>For help with specific tasks, see <u>How to</u>.</li> <li>For general background information, see <u>Concepts</u>.</li> <li>For problem-solving instructions, see <u>Troubleshooting</u>.</li> </ul>

Microsoft Management Console

Note: You may need to be logged in as an administrator or as a member of the Administrators group to perform some tasks associated with the Disk Defragmenter. Disk Defragmenter should be run every three months.

#### Disk Cleanup

Disk Cleanup is another tool that helps keep Windows XP operating as it should. It inspects your hard disk and looks for files that can be safely deleted. Deleting unnecessary files frees up valuable disk space.

To run Disk Cleanup:

- 1. Choose Start  $\rightarrow$  All Programs  $\rightarrow$  Accessories  $\rightarrow$  System Tools  $\rightarrow$  Disk Cleanup.
- 2. The Disk Cleanup window opens. Click the Disk Cleanup tab if it's not showing.
- 3. Disk Cleanup lists several potential files that can be deleted, as well as the amount of disk space you'll gain by emptying each one.
- 4. To learn more about a file category, click it and click the View Files button. A description appears.

- 5. Click the check boxes next to the categories you want to delete, then click OK.
- 6. A dialog box appears asking whether you are sure you want to perform these actions. Click Yes or No as appropriate.

💰 Disk Cleanup for (C:)	2 🛛			
Disk Cleanup More Options				
You can use Disk Cleanup to free up to space on (C:).	18,152 KB of disk			
Files to delete:				
🗹 🖻 Downloaded Program Files	0 KB 🔼			
🔒 Temporary Internet Files	17,944 KB 🔤			
🔲 🔝 Offline Web Pages	1 KB 📃 📗			
🔽 🚅 Debug Dump Files	27 KB			
🗹 🥑 Recycle Bin	34 KB 👿			
Total amount of disk space you gain:	18,014 KB			
The Temporary Internet Files folder contains Web pages stored on your hard disk for quick viewing. Your personalized settings for Web pages will be left intact.				
	View Files			
	Cancel			

# Disk Cleanup

The More Options tab gives you even more disk cleanup options.

💰 Disk Cleanup for (C:) 🔹 🛛 😨
Disk Cleanup More Options
Windows components
You can free more disk space by removing optional Windows components that you do not use.
Clean up
Installed programs
You can free more disk space by removing programs that you do not use.
Clean up
System Restore
You can free more disk space by removing all but the most recent restore point.
Clean up
OK Cancel

Note: It's recommended that you run Disk Cleanup every three months.

The Scheduled Task Wizard

Fortunately, you don't need to remember to run each of these utilities. Windows XP includes a Scheduled Task Wizard that runs each of them for you.

To open the Scheduled Task Wizard:

• Choose Start → All Programs → Accessories → System Tools → Scheduled Tasks. OR

- 1. Choose Start  $\rightarrow$  Control Panel  $\rightarrow$  Performance and Maintenance  $\rightarrow$  Scheduled Tasks.
- 2. The Scheduled Tasks folder opens.
- 3. Double-click Add a Scheduled Task.
- 4. The Scheduled Tasks Wizard opens.

5. Keep clicking Next to select the program(s) you want Windows to run. If the task you want is not listed, click the Browse button to locate it. Then schedule a convenient time.



The Scheduled Task Wizard's welcome page

Dealing with an unresponsive computer

While performing regular maintenance on your computer should keep it running smoothly, it still may occasionally freeze up or become unresponsive to the click of a mouse or keyboard.

• If your computer freezes, try waiting it out. Sometimes it takes your computer a few seconds to complete a task.

OR

• Press the ESC on your keyboard.

OR

• Press Ctrl + Alt + Delete on your keyboard. The Windows Task Manager opens. Here, you can monitor applications, processes, performance, networking, and users. If you need to restart your computer, choose Shut Down → Restart. If you need to turn off your computer, choose Shut Down → Turn Off.

📕 Windows Task Manager	
File Options View Windows	Shut Down Help
Applications Processes Perfo	Stand By Hibernate Turn Off Restart Log Off Santo Switch User WinKey+L
End	Task Switch To New Task
	.::

2.5 Procedure to disk fragmentation using system tools initialization:

The instructions below will assist you in creating a dialup connection in Windows XP.

- 1. Open the Control Panel by clicking your Windows Start menu, button, then click Control Panel.
  - If you do not see the Control Panel, click on Settings and the Control Panel icon should be revealed. On the left-hand side of your Control Panel, you will see either Switch to Classic View or Switch to Category View. If you see Switch to Classic View, click it. Otherwise, you do not need to click anything here.
- 2. Double-click on the Network Connections icon.



- 3. Click Create a new connection on the left-hand side of Network Connections. The New Connection Wizard will now start.
- 4. Click Next.



- 5. Select Connect click Next. Internet and to the New Connection Wizard Network Connection Type What do you want to do? Oconnect to the Internet Connect to the Internet so you can browse the Web and read email. Connect to the network at my workplace Connect to a business network (using dial-up or VPN) so you can work from home, a field office, or another location. O Set up an advanced connection Connect directly to another computer using your serial, parallel, or infrared port, or set up this computer so that other computers can connect to it. < Back Next > Cancel
- 6. Select Set up my connection manually and click Next.

New Connection Wizard
Getting Ready The wizard is preparing to set up your Internet connection.
How do you want to connect to the Internet?
Set up my connection manually
For a dial-up connection, you will need your account name, password, and a phone number for your ISP. For a broadband account, you won't need a phone number.
○ Use the <u>C</u> D I got from an ISP
< <u>B</u> ack <u>N</u> ext > Cancel

# 7. Select Connect using a dial-up modem and click Next.

New Connection Wizard
Internet Connection How do you want to connect to the Internet?
Connect using a dial-up modem This type of connection uses a modem and a regular or ISDN phone line.
Connect using a broadband connection that requires a user name and password
This is a high-speed connection using either a DSL or cable modem. Your ISP may refer to this type of connection as PPPoE.
Connect using a broadband connection that is <u>a</u> lways on This is a high-speed connection using either a cable modem, DSL or LAN connection. It is always active, and doesn't require you to sign in.
< Back Next > Cancel

8. Under ISP Name, type West net and then click Next.

ew Connection Wizard	
Connection Name What is the name of the se	ervice that provides your Internet connection?
Type the name of your ISP i ISP N <u>a</u> me	in the following box.
Westnet	
The name you type nere wil	The the name of the connection you are creating.
	< <u>B</u> ack Next > Cancel

9.	Under Phone	number,	type	0198308333	and	then	click Next.
	New Connectio	on Wizard					
	Phone Numb What is yo	<b>er to Dial</b> ur ISP's phone nun	nber?			Ŋ	
	Type the p	hone number belov	v.				
	01983	08333					
	You mi you ne hear a	ght need to include ed the extra numbe modem sound, the	e a "1" or the ers, dial the ph number diale	area code, or both. If you ione number on your tele d is correct.	ı are not sur	5	
				< <u>B</u> ack	xt >	Cancel	

10. Type your username and password into the relevant text boxes, then click Next.

Type an ISP account name an safe place. (If you have forgott	d password, then write down this information and store it en an existing account name or password, contact your
User name:	]
Password:	
Confirm password:	
Make this the default Inten	net connection

11. Click on Add a shortcut to this connection to my desktop and then click Next.



You will now have a West net icon on your desktop. To connect to the internet, doubleclick the icon and press Connect.



2.6 Installing a printer using Control Panel:

Adding a printer to your computer involves two steps: making the connection from the computer to the printer using either a parallel or USB cable, and installing the software needed to allow your computer to communicate with the specific printer you want to use.

Most printers sold today support USB, which can transfer data much faster than the older parallel connector. If you have an older printer, you may only have the parallel connector as a connection option.

http://etc.usf.edu/te\_win/i/cnctprnt.gif

The first step to adding a printer is to make sure the cables are securely connected on both ends (computer and printer).

Once you have physically connected the printer, you will also need to install the software needed to allow the computer to send print jobs to it. This software is often supplied on a disk by the printer's manufacturer, but most printers will work with the drivers supplied with Windows XP. The driver software provided by the manufacturer may add extra features, such as giving you information about the ink levels.

To install a new printer with Windows XP's, Add Printer Wizard, follow these steps:

1. Click the Start button on the Windows taskbar and then click Control Panel on the right side of the Start menu.

2. Click the Printers and Other Hardware hyperlink if the Control Panel window is in Category View. Otherwise, double-click the Printers and Faxes icon if the Control Panel window is in Classic View.



3. Click on the Add a Printer hyperlink in the Printers and Other Hardware window to start the Add Printer Wizard and then click the Next button or press Enter to advance to the Local Printer or Printer Connection dialog box. If you are in Classic View, start the wizard by clicking on the Add a Printer option on the left, under Printer Tasks.





4. Make sure that the Add Printer Wizard selects the Local Printer radio button, and that the Automatically Detect and Install my Plug and Play Printer check box beneath this radio button is also selected before you click the Next button.

Add Printer Wizard
Local or Network Printer The wizard needs to know which type of printer to set up.
Select the option that describes the printer you want to use:
<ul> <li>Local printer attached to this computer</li> </ul>
Automatically detect and install my Plug and Play printer
A network printer, or a printer attached to another computer
To set up a network printer that is not attached to a print server, use the "Local printer" option.
< Back Next > Cancel

5. If the wizard is unable to detect your printer in the New Printer Detection dialog box, click Next to install the printer manually.

6. Select the port for the printer to use in the Use the Following Port drop-down menu in the Select a Printer Port dialog box and then click the Next button. You should select either LPT1 (if you are connecting your printer using a parallel connector) or USB.
| dd Printer Wizard  |
|--|
| Select a Printer Port<br>Computers communicate with printers through ports.  |
| Select the port you want your printer to use. If the port is not listed, you can create a new port.  |
| Use the following port: LPT1: (Recommended Printer Port)   |
| Note: Most computers use the LPT1: port to communicate with a local printer.<br>The connector for this port should look something like this: |
|  |
| Create a new port:   |
|  |
| < Back Next > Cancel   |

7. Click the manufacturer and the model of the printer in the Manufacturers and Printers list boxes, respectively. If you have a disk with the software for the printer, put it into your floppy or CD-ROM drive and then click the Have Disk button: Select the drive that contains this disk in the Copy Manufacturer's Files drop-down menu and then click OK.

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Select the manufac disk, click Have Di	urer and model of your printer. If your c. If your printer is not listed, consult ;	r printer came with an installation your printer documentation for
compatible printer s	ftware.	
Manufacturer	Printers	
Agfa Alps Apollo	AGFA-AccuSet v52.3	3
Apple		

8. Click the Next button to advance to the Name Your Printer dialog box. If you want, edit the name for the printer in the Printer Name text box. If you want to make the printer that you're installing the default printer that is automatically used whenever you print from Windows or from within a Windows program, leave the Yes radio button selected beneath the heading, do you want your Windows-based programs to use this printer as the default printer?

Name Your Printer	A Contraction of the second seco
You must assign a name to this pi	inter.
Type a name for this printer. Beca name combinations of more than 3 possible.	ause some programs do not support printer and server 31 characters, it is best to keep the name as short as
Printer name:	
AGFA-AccuSet v52.3	
Do you want to use this printer as	the default printer?
Yes	
⊙ Yes ◯ No	
⊙ Yes ◯ No	
⊙ Yes ○ No	

9. Click the Next button to advance to the Printer Sharing dialog box. If you want to share this printer with other users on the network, click the Share Name radio button and then, if you want, edit the share name that the wizard gives the printer in the Share Name text box (this is the name that the other users on the network will see when they go to select this printer for printing their documents).

You can share this	s printer with other network users.
If you want to shar suggested name o	re this printer, you must provide a share name. You can use the or type a new one. The share name will be visible to other network
users.	
💿 Do not share th	his printer
🔘 Share name:	

10. Click the Next button to advance to the Print Test Page dialog box. To print a test page from your newly installed printer, make sure the Yes radio button is selected in this dialog box.

Add Printer Wizard
Print Test Page To confirm that the printer is installed properly, you can print a test page.
Do you want to print a test page?
⊙ Yes
◯ No
< Back Next > Cancel

11. Click the Next button to advance to the Completing the Add Printer Wizard dialog box, where you can review the settings for your new printer before you click the Finish button or press Enter to finish installing the new printer.

Add Printer Wizard		
	Comple Wizard	ting the Add Printer
	You have suc You specified	ccessfully completed the Add Printer Wizard. I the following printer settings:
	Name:	AGFA-AccuSet v52.3
	Share name:	<not shared=""></not>
Post 1772	Port:	LPT1:
	Model:	AGFA-AccuSet v52.3
	Default	Yes
	Test page:	Yes
	To close this	wizard, click Finish.
		Kenter Ke

2.7 Procedure for Changing resolution, color, appearance and screen saver options of the display:

2.7.1 Resolution:

Display Properties ? 🗙
Themes Desktop Screen Saver Appearance Settings
(c) helpwithpcs.com Display: SAMTRON 56E/57E/56V on NVIDIA RIVA TNT2 Model 64
Screen resolution       More         Less       More         1024 by 768 pixels       Highest (32 bit)         Troubleshoot       Advanced
fig 1.1 OK Cancel Apply

First right-click on the desktop and then left click on Properties from the menu that appears.

The display properties dialogue box will appear as shown in fig 1.1 below, click on the settings tab at the top right of the box.

#### Preview

If you have more than one display output, such as a VGA or HDMI connector on a laptop, here you can select for which display device you wish to alter the resolution settings.

Display

This provides information on the manufacturer and model of both your monitor and video card.

Screen Resolution

This slide bar is what you use to change the resolution, the options you have will depend on your graphics card and monitor, but the standard options are 800x600, 1024x768 and 1152x864.

Normally the default (in XP) is set to 800x600 which means the display will be 800 pixels wide and 600 pixels high.

Color Quality

PAPER III

This pull-down box will contain the current color options available, again this will depend on your graphics card and monitor, for best results select the highest option available.

Changing the Resolution

To change your resolution simply slide the bar along to the resolution of your choice and then click the Apply button.

After clicking Apply your screen will resize to the new resolution and you will be presented with a confirm dialogue box, if you are happy with the way your screen looks then simply click Yes, if you would like to try a different resolution click No.

When you have finished simply close the Display properties box.

note: It is best to use your PC for a while in the new resolution to see if it is suitable for you.

2.7.2 Changing Color:

Open the 'Start 'menu by clicking on the 'Start 'button or by pressing the 'Windows 'logo key (located between the 'Ctrl '+ 'Alt 'keys on most keyboards) alternatively press 'Ctrl '+ 'Esc '.

Click on 'Control Panel 'or press 'C 'until 'Control Panel 'is selected and then press 'Enter 'if necessary.

Note: in earlier versions of XP you will need to click on 'Settings 'or press the letter 'S 'on the keyboard first.

If you see the text 'Pick a category ' (see Fig 1) as the main title on the page and under the Control Panel title you can see 'Switch to Classic View ' you need to click the 'Switch to Classic View ' (you are currently in 'Category View') by clicking on the link or by pressing tab until the 'Switch to Classic View ' is selected and then press 'Enter '.



Fig 1

In Classic view double click on 'Display 'or press the 'D 'key repeatedly until 'Display 'is highlighted and then press 'Enter '.

Click on the 'Appearance 'tab or press 'Control '+ 'Tab 'until the 'Appearance 'tab is at the front. In Fig 2 you can see a sample Window screen and below it three drops down menus listing

the 'Windows and buttons 'style (XP or classic), the currently selected 'Color scheme 'and the 'Font size '.

Inactive Wind	low East		
Active Windo		100	- I I X
Normal Disab	oled Selected		
Window Text	t		
Message Bo	ж	×	
Message Text	F		-
- I have age ton	OV	-	
	ОК		
	ок		
indows and buttons	ок		
indows and buttons /mdows Classic style	OK E		
indows and buttons /indows Classic styl			
indows and buttons /indows Classic styl lor scheme: /indows Standard			
indows and buttons /indows Classic styl ilor scheme: /indows Standard			Effects

## Fig 2

Click the drop-down box below the 'Color scheme 'heading, or press 'Alt '+ 'C 'to jump there. Use the mouse or the up and down arrow keys to browse through the list and click on the scheme you want, or press 'Enter', to select a scheme. Click 'OK 'or press 'Enter 'to exit the 'Display Properties 'dialog box.

Changing individual colors

As well as choosing schemes you can change colors individually such as desktop color and window background color under the 'Advanced 'options.

Note: To fully use the 'Advanced 'options feature you must have your 'Windows and buttons 'setting set to 'Windows Classic style 'as shown in Fig 2 above.

To change individual colors:

Repeat steps 1 -5 above.

Click on 'Advanced 'button or press the 'Tab 'key until the 'Advanced 'button is highlighted and then press 'Enter '. This will display the 'Advanced Appearance 'window as shown in Fig 3.

	-	T	?
Inactive Window		_I_I ×	
Active Window		_10	
Normal Disabled Selected			
Window Text			-
Massaga Boy	×1		
Message Text	-		-
OK			-
you select a windows and buttons set will override the following settings, exc m: esktop	ting other that tept in some o	n Windows ( Ider progran Color 1:	Classie ns. Color (
vou select a windows and buttons set will override the following settings, exo m: esktop	Size:	Color 1: Color 2: Col	Classic ns. Color ;
vou select a windows and buttons set will override the following settings, exc m: esktop	ing other that rept in some of Size: Size:	n Windows ( Ider program Color 1: ( Color:	Dassin ns. Dolor ( B

### Fig 3

Click on the drop-down box below the 'Item 'heading, as highlighted in Fig 3 above or press 'Alt '+ 'I 'to jump there.

Use either the mouse or the up and down arrow keys to navigate through the list of items. As an example, we 'll change the 'Menu 'color scheme from its usual grey background with black text.

Move down the list until 'Menu 'is highlighted.

Click on the color box to the right of the 'Item' drop down box and choose a different color from the color grid that pops up (see Fig 4) by clicking on it or press 'Alt '+ 'L ' to select the color box and press the 'Spacebar ' to display the color grid then press 'Alt '+ 'O ' to bring up 'Other ' color options. In the color box that comes up press 'Alt '+ 'B 'to jump to the 'Basic Colors 'box then use the arrow keys to choose the color you want and then press the 'Spacebar 'to select it and then press 'Enter 'to return to the 'Display Properties 'page.

Г		Г	
Г		Γ	
Γ			
Γ	ГГ	Г	
	<u>O</u> th	er	

Fig 4

Now you have changed the menu background color, let 's changes the text color on the menus. Make sure that Menu is still selected in the Item drop down box - if not then repeat the steps above to select it.

Click on the second color box on this page (directly below the first one we used and to the right of the 'Font 'box ), and choose a different color by clicking on it, or press 'Alt ' + 'R ' to select the color box and press the 'Spacebar 'to display the color grid then press 'Alt ' + 'O ' to bring up 'Other ' color options (see Fig 5 below). In the color box that comes up press 'Alt '+ 'B 'to jump to the 'Basic Colors 'box then use the arrow keys to choose the color you want and then press the 'Spacebar 'to select it and then press 'Enter 'to return to the 'Display Properties 'page.



## Fig 5

Press 'Enter 'or click 'OK 'to return to Windows where you should be able to view your changes.

Note: If this does not work it could be because your computer settings cannot be changed due to local IT policies - contact your local IT support for further help.

2.7.3 Appearance and Screen saver options of Display:

You don't have to be a computer genius to use Windows XP, but if you know something about how to set up some basic features and functions it will do a lot more for you. Windows XP makes this easier than ever with the Control Panel. The Control Panel features many tools that will help you control how Windows XP features look and act. But first you must learn how to access the Control Panel.

To access the Control Panel:

- 1. Click Start.
- 2. Click Control Panel.
- 3. The Control Panel opens.

OR

• Type Control Panel in the Address dialog box found on any Windows XP window.

OR

• Many folders feature a link to the Control Panel in the See Also dialog box (only in XP view).

No matter how you get to the Control Panel, it will look like this upon first viewing:



Navigate the Control Panel

If you're used to a previous version of Windows, you'll notice that the Control Panel in Windows XP looks different.

The Windows XP Control Panel is divided into Categories. If you click a category, the window presents a List of Tasks and related Control Panel icons.

Note: Task and Control Panel icons perform basically the same functions. For example, notice that you can "Choose a screen saver" in the Pick a Task list. Clicking this link opens the Display Properties dialog box. However, if you were to choose the Display icon, the Display Properties dialog box opens.

If you look at the left side of the window, you'll notice that the See Also and Troubleshooters dialog boxes provides several more related options.

The Windows XP Control Panel is designed to provide multiple ways to do something, thereby making it more user friendly. However, the new Control Panel design doesn't provide you with access to every available Control Panel tool—it only provides you with access to the most commonly used tools.

To access ALL your Control Panel tools, you must switch to Classic view.

To switch to Classic view:

- Click the Classic View link on the left side of your Control Panel.
- Click the Switch to Category View link to switch back.



Use the menu bar and toolbar buttons to navigate and further explore Control Panel options.

Changing the wallpaper

Wallpaper is the background image that appears on your desktop. Windows XP offers many wallpaper choices.

To change the wallpaper:

- 1. Open the Control Panel (located in Start menu).
- 2. Under Pick a Category, click Appearance and Themes.
- 3. Under Pick a Task, click Change the desktop background.
- 4. The Display Properties dialog box opens with the Desktop tab selected.
- 5. In the Background box, click or use the arrow keys to view the choices.
- 6. Use the drop-down boxes to alter the wallpaper position or color.
- 7. Click OK to close the dialog box.



Advanced users:

- Click Browse... to choose a picture from the My Pictures folder (or to navigate to a picture located in another folder).
- Click the Customize Desktop button to alter your desktop icons or display a webpage on your desktop.

Changing the screensaver

In the early days of computing, screensavers helped prevent images from being burned into the monitor. Now screensavers entertain us, provide some privacy, and enhance our work or home environment. Windows XP comes with several screensavers.

To change the screensaver:

- 1. Open the Control Panel (located in Start menu).
- 2. Under Pick a Category, click Appearance and Themes.
- 3. Under Pick a Task, click Choose a screen saver.
- 4. The Display Properties dialog box opens with the Screen Saver tab selected.
- 5. Click the arrow to open a drop-down box. Click or use the arrow keys to view the choices. Or click Preview to view each option on your computer screen. Press any key on your keyboard to return to the dialog box.
- 6. Click Settings to customize the appearance of your chosen screensaver. (A dialog box will notify you if your choice doesn't have any options.)
- 7. In the Wait box, determine how many minutes should pass before your screensaver turns on.
- 8. Click OK to close the dialog box.

Display Properties
Themes Desktop Screen Saver Appearance Settings
Background:
Tulips     Browse     Browse
Wind     Position:
🔊 Windows XP Stretch 😒
xrline1_red_black     Color:
Customize Desktop
OK Cancel Apply

Customizing the taskbar

You already know about the taskbar, but did you know you can customize its appearance?

To customize the Start menu:

- 1. Open the Control Panel (located in Start menu).
- 2. Under Pick a Category, click Appearance and Themes.
- 3. Under Pick a Control Panel icon, click Taskbar and Start Menu.
- 4. The Taskbar and Start Menu Properties dialog box opens with the Taskbar tab displayed.
- 5. Use the check boxes to customize its appearance, then click OK.

Taskbar and Start Menu Properties 🛛 🔹 🔀
Taskbar Start Menu
Taskbar appearance
🐉 start 🛛 😂 🙆 💊 😂 2 Internet+ 🛅 Folde
✓ Lock the taskbar
Auto-hide the taskbar
Keep the taskbar on top of other windows
Group similar taskbar buttons
Show Quick Launch
Notification area
🍟 🕮 📾 🕵 1:23 PM
Show the clock
You can keep the notification area uncluttered by hiding icons that you have not clicked recently.
Hide inactive icons     Customize
OK Cancel Apply

Click the Start Menu tab to switch between the XP Start menu and Classic Start menu. Classic Start menu is the Start menu that was featured in older versions of Windows.

2.7.4 Process of Changing the System Date and Time:

Set the time and date

To change the time and date:

- 1. Open the Control Panel (located in Start menu).
- 2. Under Pick a Category, click Date, Time, Language, and Regional Options.
- 3. Under Pick a Task, click Change the date and time.
- 4. The Date and Time Properties dialog box opens.
- 5. Use the drop-down box to set the month and year.
- 6. Click the correct date on the calendar.
- 7. Click and select the current time to make a change.

- 8. If necessary, click the Time Zone tab and use the drop-down box to change the time zone.
- 9. Click OK to close the dialog box.

OR

- 1. Right-click the time in the lower-right on your desktop.
- 2. Choose Adjust Date/Time.
- 3. The Date and Time Properties dialog box opens.
- 4. Follow steps 5-9 from above.



# SUMMARY:

- Software plays crucial and prominent role for any computer application
- Storage of data either on a Floppy Disk, Hard Drive, CD/DVD ROM, USB (Universal Serial Bus: used to designate a kind of standard interface for connecting peripherals to a computer)
- Installing the Hardware, Software is done by using the Control Panel
- The System Tools option helps to find the Disk Clean, Fragmentation
- The Date / Time properties can be done in the My Computer
- Display properties will help in changing the resolution color and appearance as per the choice or needs of the user

Short Answer Questions (SAQ)

- 1. What is meant by formatting a floppy disk?
- 2. What are the requirements to install a new software?
- 3. What is meant by uninstalling a software?
- 4. What is hardware?
- 5. How to install a mouse?
- 6. How to find disk space of a floppy?
- 7. How to find the occupied space in a disk?
- 8. What is meant by defragmentation?
- 9. What is the need of defragmentation?
- 10. Give me any two examples of modem?

# **UNIT III**

## Structure:

- 3.1 Word Processor
- 3.2 Formatting Text
- 3.3 Typical Special Characters and Saving Document
- 3.4 Tables
- 3.5 Printing a document
- 3.6 Checking Spelling and Grammar
- 3.7 Headers and Footers
- 3.8 Mail merge

# Learning Objectives:

On Completion of this unit, the learner will be able to:

- State the role of word-processor package in Information Technology
- Explain the features of word processing and the process of copy, cut and pasting text with in the same file and into another file
- Describe the method of create, open and close the file
- Explain the procedure of format the text, use of fonts type, size, color, spacing in between the characters and spacing the line to arrange the text in an attractive manner
- Describe the methods of inserting symbols and special characters
- Explain saving a document
- Formatting the paragraph
- Explain the process of preparing the text with Bullets or with numbers to enlighten the important points of the text
- To prepare the text in the form of multiple columns in news paper

# **3.1 Entering Text Using Word:**

To begin, open Microsoft Word. Your screen will look like the one shown here.



Click the X in the upper right corner of the New Document pane to close the New Document pane. Your screen will then look like the one shown here.

🚰 Document1 - Mi	icrosoft Word		<u> </u>	2 8
Ele Edt Yew	Insert Format Tools Tab	le <u>W</u> indow	Type a guestion for help	• н
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Page 1 Sec 1	1/1 // 1	PLT COLT MECHINALISKI LOW		_

The Title Bar

型 Document1 - Microsoft Word 🛛 🗐 🖻 🔀

This lesson will familiarize you with the Microsoft Word screen. We will start with the Title bar, which is located at the very top of the screen. On the Title bar, Microsoft Word displays the name of the document on which you are currently working. At the top of your screen, you should see "Microsoft Word - Document1" or a similar name.

The Menu Bar

Eile	<u>E</u> dit	View	Insert	Format	Tools	Table	Window	Help	Type a question for help	, x	¢
------	--------------	------	--------	--------	-------	-------	--------	------	--------------------------	-----	---

The Menu bar is generally found directly below the Title bar. The Menu bar displays the menu. The Menu bar begins with the word File and continues with Edit, View, Insert, Format, Tools, Table, Window, and Help. You use the menus to give instructions to the software. Point with your mouse to a menu option and click the left mouse button to open a drop-down menu. You can now use the left and right arrow keys on your keyboard to move left and right across the Menu bar options. You can use the up and down arrow keys to move up and down the drop-down menu.

	Toc	ols T <u>a</u> ble <u>W</u> indow <u>H</u> elp				
1000	ABG	Spelling and Grammar F7				
le	1	<u>R</u> esearch Alt+Click				
-		Language 🕨 🕨 🗕				
4		Word Count				
-		Speech				
		Shared Wor <u>k</u> space				
		Letters and Mailings				
		Customize				
		Options				
		8				

The most frequently used menu options appear on the menu list. A chevron appears at the bottom of the list. Click the chevron to display additional menu options.



To select an option, click the option or use the arrow keys to move to the option on the dropdown menu and press Enter. An ellipse or a right arrow after a menu item signifies additional options; if you select that menu item, a dialog box appears. Items in gray are not available.

You can customize your screen so that all the menu options display when you click a menu item. This tutorial assumes that your menu is set to display all menu options. To customize your menu to display all the menu options:

- 1. Click Tools on the Menu bar.
- 2. Click Customize on the drop-down menu. The Customize dialog box opens.
- 3. Click the Options tab.
- 4. Click in the check box to select Always Show Full Menus.

Toolgars Comma	ands Options
Personalized Menus	and Toolbars
📝 Show Standar	d and Formatting toolbars on two rows
Always show f	ull me <u>n</u> us
Show full a	menus after a short delay
Reset menu and	toolbar usage data
Other	
[] Large icons	
Large icons	s in their font
Large kons U List font name U Show ScreenI	s in their font ips on toolbars
List font name Show Screen <u>1</u> Show shor	s in their font Tips on toolbars tcut keys in ScreenTips
Large icons List font name Show Screen Show shor Menu animations:	s in their font ips on toolbars tout keys in ScreenTips (System default)
List font name List font name Show Screen Show shor Menu animations:	s in their font Tips on toolbars tout keys in ScreenTips (System default)

5. Click Close.

## Exercise 1

Do the following exercise. It demonstrates using the Microsoft Word menu.

- 1. Click File on the Menu bar.
- 2. Press the right arrow key until Help is highlighted.
- 3. Press the left arrow key until Format is highlighted.
- 4. Press the down arrow key until Styles and Formatting are highlighted.
- 5. Press the up-arrow key until Paragraph is highlighted.
- 6. Press Enter to select the Paragraph menu option.
- 7. Click Cancel to close the dialog box.

### Toolbars

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The Standard Toolbar						
🚹 Times New Roman	• 12 • B I U 📑 🖷 🔳 🚍	≘∉∣⊞▼ <u>▲</u> ▼				

### The Formatting Toolbar

Toolbars provide shortcuts to menu commands. Toolbars are generally located just below the Menu bar. Before proceeding with this lesson, make sure the toolbars you will use -- Standard and Formatting -- are available. Follow these steps:

- 1. Click View on the Menu bar.
- 2. Highlight Toolbars.

- 3. Standard and Formatting should have check marks next to them. If both Standard and Formatting have heck marks next to them, press Esc three times to close the menu.
- 4. If they do not both have check marks, click Customize.
- 5. Click the Toolbars tab.
- 6. Point to the box next to the unchecked option and click the left mouse button to make a check mark appear.

Note: You turn the check mark on and off by clicking the left mouse button.

7. Click Close to close the dialog box.

The Ruler

The ruler is generally found below the main toolbars. The ruler is used to change the format of your document quickly. To display the ruler:

- 1. Click View on the Menu bar.
- 2. The option Ruler should have a check mark next to it. If it has a check mark next to it, press Esc to close the menu. If it does nothave a check mark next to it, continue to the next step.
- 3. Click Ruler. The ruler now appears below the toolbars.

## Document View

In Word, you can display your document in one of five views: Normal, Web Layout, Print Layout, Reading Layout, or Online Layout.

Normal View

Normal view is the most often used and shows formatting such as line spacing, font, point size, and italics. Word displays multiple-column text in one continuous column. Web Layout

Web layout view enables you to view your document as it would appear in a browser such as Internet Explorer.

Print Layout

The Print Layout view shows the document as it will look when it is printed. Reading Layout

Reading Layout view formats your screen to make reading your document more comfortable.

Outline view

Outline view displays the document in outline form. Headings can be displayed without the text. If you move a heading, the accompanying text moves with it.

## Word 2002

In Word 2002, you can display your document in one of four views: Normal, Outline, Page Layout, or Online Layout.

Normal view

Normal view is the most often used and shows formatting such as line spacing, font, point size, and italics. Word displays multiple-column text in one continuous column. Outline view Outline view displays the document in outline form. Headings can be displayed without the text. If you move a heading, the accompanying text moves with it. Print Layout view The Print Layout view shows the document as it will look when it is printed. Online Layout view The Online Layout view optimizes the document for online viewing (viewing the document in a browser such as Internet Explorer).

Before moving ahead, check to make sure you are in Normal view:

- 1. Click View on the Menu bar.
- 2. The icon next to Normal should have a box around it. If the icon next to normal has a box around it, press Esc to close the menu. If the icon next to Normal does not have a box around it, continue to the next step.
- 3. Click Normal. You are now in Normal view.

Text Area



Just below the ruler is a large area called the "text area." You type your document in the text area. The blinking vertical line in the upper left corner of the text area is the cursor. It marks the insertion point. As you type, your work shows at the cursor location. The horizontal line next to the cursor marks the end of the document.

Exiting Word

You have completed Lesson One. Typically, you would save your work before exiting. This lesson does not require you to enter any text, so you might have nothing to save. To exit Word:

- 1. Click File.
- 2. Click Exit, which can be found at the bottom of the drop-down menu.
- 3. If you have entered text, you will be prompted: "Do you want to save changes to Document1?" To save your changes, click Yes. Otherwise, click No.
- 4. Specify the correct folder in the Save In box.
- 5. Name your file by typing lesson1.doc in the File Name field.
- 6. Click Save.

# 3.4 Saving a Document

## Save a document for the first time

On the **Quick Access Toolbar**, click **Save**, or press CTRL+S.

1. Type a name for the document, and then click **Save**.

Word saves the document in a default location. To save the document in a different location, select another folder or location before you click **Save**.

### Save an existing document as a new document (Save As)

To prevent overwriting an existing document, use the **Save As** command to create a copy of the existing document with a new name. You might want to do this, for example, when you have a form letter, lease document or any other situation where an existing document will provide all the basic content for a new document (and you don't want to lose the existing document).

- 1. Open the document that you want to use as the basis for the new document.
- 2. Click **File**, and then click **Save As**.
- 3. Type a name for the document, and then click **Save**.

Word saves the document in a default location. To save the document in a different location, select another folder or location before you click **Save**.

4. Edit the document the way that you want.

## Save a document so that it can be opened in a previous version of Word

If you save your document in the default file format in Microsoft Office Word 2007, Word 2010, Word 2013 and Word 2016, users of previous versions of Word must install the <u>Microsoft Office</u> <u>Compatibility Pack for Word, Excel, and PowerPoint 2007 File Formats</u> to open the document. Alternatively, you can save the document in a format that can be opened directly in previous versions of Word — but formatting and layout that depend on new features in Microsoft Office Word 2007, Word 2010, Word 2013 or Word 2016 will not be available in the previous version of Word.

- 1. Click **File**, and then click **Save As**.
- 2. Click **Word 97-2003 Format**.
- 3. Type a name for the document, and then click **Save**.

### Save a document in alternative file formats

If you are creating a document for others, you can make them readable and not editable, or you can make them readable and editable. If you want a document to be readable but not editable, save the document as a PDF or XPS file, or save it as a webpage. If you want your document to be readable and editable but prefer a file format other than. docks or .doc, you can use formats such as, plain text (.txt), Rich Text Format (.rtf), and OpenDocument Text (. odt).

**PDF and XPS** - PDF and XPS are formats that people can read in widely available viewing software. These formats preserve the page layout of the document.

**Webpages** - Webpages are displayed in a web browser. This format does not preserve the page layout of your document. As someone resizes the browser window, the layout of the document changes. You can save the document as a conventional webpage (HTML format) or as a single-file webpage (MHTML format). With HTML format, any supporting files (such as images) are stored in a separate folder that is associated with the document. With MHTML format, all supporting files are stored together with the document in one file.

**Note:** You can save a document in other formats that can be opened by several text editing programs. Among these formats are plain text (.txt), Rich Text Format (.rtf), and OpenDocument Text (. odt). However, saving a Microsoft Office Word document in these formats does not reliably preserve the formatting, layout, or other features of the document. Use these formats only if you don't mind losing these aspects of your document. You can choose these formats from the list in the **Save As** dialog box.

## 3.5 Setting Margins and Indents:

Text alignment, margins, and line spacing will affect the entire paragraph even if you have only a single word selected, or the insertion point placed in the paragraph. To format multiple paragraphs, you need to select at least one character from each paragraph. You can align text with the right or left margins, center the text, or align the text with both margins.

### **Changing Text Alignment: Toolbar Option**

- 1. Select the text to be formatted
- 2. On the *Formatting* toolbar, click the appropriate button:



# **Changing Text Alignment: Menu Option**

- 1. Select the text to be formatted
- 2. From the *Format* menu, select *Paragraph*... The *Paragraph* dialog box appears.

<sup>o</sup> aragraph			? ×
Indents and Spa	acing Line and Page	Breaks	
General ——— Alignment:		<u>O</u> utline level:	Body text 💌

- 3. Select the *Indents and Spacing* tab
- 4. From the Alignment pull-down list, select Left, Centered, Right, or Justified
- 5. Click **OK**

## **Changing Text Alignment: Keyboard Option**

- 1. Select the text to be formatted
- 2. Press the appropriate keyboard key:

Alignment Option	Keystroke
Left	[Ctrl] + [L]
Centered	[Ctrl] + [E]
Right	[Ctrl] + [ <b>R</b> ]
Justified	[Ctrl] + [J]

# 📥 Adjusting Line Spacing

You can add space between lines within a paragraph by adjusting the line spacing. For example, you may want your text double-spaced. This is an efficient way of adding white space.

- 1. Place the insertion point in the desired paragraph
- 2. From the *Format* menu, select *Paragraph*... The *Paragraph* dialog box appears.

<sup>o</sup> aragraph				? X
Indents and Sp	acing Line and Pa	ge Breaks		
General ——— Alignment:	left <b>. T</b>	<u>O</u> utline level:	Body text	•
Indentation — Left: <u>R</u> ight:	0" 🗘	Special: (none) 💌	в <u>у</u> :	÷
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- 4. Select the *Indents and Spacing* tab
- 5. In the *Spacing* section, from the *Line spacing* pull-down list, select the desired spacing option

Options include *Single*, *1.5 lines*, *Double*, *At least*, *Exactly*, and *Multiple*. NOTE: The *At least*, *Exactly*, and *Multiple* options require that you enter the amount of space between lines in the *At* text box.

6. Click **OK** 

## **3.6 Formatting Paragraphs:**

Instead of putting extra returns at the end of paragraphs, add additional space before and after paragraphs by adjusting the paragraph spacing. This can be especially useful when you want the blank line to be a different height from the text.

- 1. Place the insertion point in the desired paragraph
- 2. From the *Format* menu, select *Paragraph*... The *Paragraph* dialog box appears.
- 3. Select the *Indents and Spacing* tab

- 4. In the *Spacing* section, in the *Before* text box, type the amount of space (in points) to appear before the paragraph
- 5. In the After-text box, type the amount of space (in points) to appear after the paragraph
- 6. Click **OK**

## Working with Indents

Rather than tabbing in the first line or every line of a paragraph, you can create an indent, which is the amount of space between the text and the page margin. You can adjust the indent for an individual paragraph, the indent for a group of paragraphs, or the margins for the entire document. If you are setting margins for the entire document, refer to <u>Adjusting Document</u> <u>Margins</u>.

Word offers three types of indents: normal indents, first line indents, and hanging indents. A normal indent inserts a specified amount of space between the page margin and all the lines in a paragraph. A first line indent inserts space between the first line and the page margin so it looks like you used a tab. A hanging indent uses a normal indent for the first line and then moves subsequent lines farther to the right.

A hanging indent looks like this.

Paragraph indents can be set using the *Paragraph* dialog box or the *Ruler*.

### Working with Indents: Dialog Box Option

- 1. Place the insertion point in the desired paragraph HINT: If you are adjusting more than one paragraph, select all desired paragraphs.
- 2. From the *Format* menu, select *Paragraph*... The *Paragraph* dialog box appears.
- 3. Select the *Indents and Spacing* tab
- 4. In the *Indentation* section, in the *Left* and *Right* text boxes, type the desired amount of indenting (in inches)
- 5. To select a different indent for the first line, from the *Special* pull-down list, select *First line* or *Hanging*
- 6. If you selected a first line or hanging indent, in the *By* text box, type the desired amount of indenting (in inches)
- 7. Click **OK**

### **Working with Indents: Ruler Option**

Instead of using the *Paragraph* dialog box, you can make indent adjustments using the *Ruler*. Shown here is a graphic of the *Ruler*.

Document1 - Microsoft Word					
Pocument1 - Microsoft Word         File Edit View Insert Format Tools Table Window Help         Image: Construction of the second state of the					
Type of Indent	Appearance of Ruler	Appearance of Text			
Normal Indent	8	A Normal Indent looks like this			
Hanging Indent	♥ 🔒	A Hanging Indent looks like this			
First Line Indent	≙▽	A First Line Indent looks like this			

### To set the indent:

- 1. Place the insertion point in the desired paragraph HINT: If you are adjusting more than one paragraph, select all desired paragraphs.
- 2. Click and drag the appropriate indent button to the desired location on the Ruler

## **3.7 Introducing Multiple Columns:**

Using the Column dialog box versus the Columns button will give you much more control and precision over your column structure. The Columns dialog box will also give you a few more column options, including left and right columns, as well as the ability to create up to eight columns per page.

To use the Column dialog box:

Switch to Print Layout view.

To make equal columns, move the insertion point to the end of the text, then insert a continuous section break by choosing Insert Break Continuous.

Select the text you want to change to columns.

Click Format on the menu bar.

Select Columns from the menu list. The Columns dialog box appears.

#### Columns Dialog Box

Columns		? 🔀
Presets <u>O</u> ne Ty	vo <u>I</u> hree Left <u>Right</u>	OK Cancel
Number of co	lumns:	Line between
<u>C</u> ol #: 1:	Width: Spacing:	
Apply to:	Whole document	Start new column

The Column dialog box gives you the following options:

Presets: Click a box to choose a preset number of columns.

Number of Columns: Use the up and down arrow keys to select between one and eight columns.

Line Between: Place lines between your columns.

Width and Spacing: Here, you can specify an exact number for the height and width of your columns, as well as the spacing between your columns.

Equal Column Width: Click this check box if you want columns to be the same width.

Apply to: This allows you to create columns out of the selected text, the selected section, this point forward, or the entire document.

To move text into the next column:

Move the insertion point in front of the text you want to move.

Choose Format Important Point Columns. The Columns dialog box opens.

Choose From this point forward in the Apply to: control.

Click the Start New Column check box to move the text to the next column

### **3.8 Creating a Table**

Tables are very useful in representing some numerical or statistical data. In Microsoft Word 2003 we have an option to insert tables in to the document.

Steps to Insert Tables in Word 2003:

1) Click on the option on <u>Tables</u> and Borders and click on Insert Table.



2) It will display the window to select columns and <u>rows</u> in a table.

Insert Table	×
Table size	
Number of <u>c</u> olumns:	5 E
Number of <u>r</u> ows:	2
AutoFit behavior	
• Fixed column width:	Auto 😂
Auto <u>Fit</u> to contents	
O AutoFit to win <u>d</u> ow	
Table style: Table Grid	AutoFormat
Remember dimensions for new	tables
ОК	Cancel

3) Choose the number of <u>Columns</u> and Rows and click ok to <u>insert</u> the table with selected rows and columns.

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# 3.9 Printing a Document

To use the options described in this document, you must access the Print dialog box.

1. From the File menu, select Print...

<u>N</u> ame:	💐 \\PRINT\BNP01		
Status:	Idle		Find Printer
Туре:	HP LaserJet 5100 PCL 5e		ring Printers.
Where:	OL1104		🔲 Print to fi <u>l</u> e
Comment:	Bits		🔲 Manual duple <u>x</u>
Page range-		Copies	
⊙ <u>A</u> ll		Number of <u>c</u> opies:	1 -
O Curr <u>e</u> nt j	page O Selection		
O Pages:			🔽 Collate
separated b	y commas. For example, 1,3,5–12		
-			
Print <u>w</u> hat:	Document 🔹	Zoom	
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Detector			· · ·
Print:			

Specifying the Pages to Print

The following table lists options for printing and the selection or specifications that you must make in the *Page range* section of the *Print* dialog box to achieve the desired results.

Printing only selected text			
1. Under <i>Page range</i> , select <i>Selection</i>	Page range O <u>A</u> ll O Curr <u>e</u> nt page ⊙ <u>Selection</u> O Pages:		
Printing all pages of your document			
1. Under Page range, select All	Page range		
---	---		
Printing the curren	t page		
1. Under Page range, select Current page	Page range O <u>All</u> O <u>Current page</u> O <u>Selection</u> O Pages:		
Printing non-contiguo	us pages		
<ol> <li>Under <i>Page range</i>, select <i>Pages</i></li> <li>Type the page numbers separated by commas</li> </ol>	Page range O <u>All</u> O Curr <u>e</u> nt page O <u>Selection</u> • Pages: 3,7,12		
Printing a range of contig	guous pages		
<ol> <li>Under <i>Page range</i>, select <i>Pages</i></li> <li>Type the beginning and end page numbers separated by a hyphen</li> </ol>	Page range O <u>A</u> ll O Curr <u>e</u> nt page O Selection ⊙ Pages: 3-6		
Printing a combination of non-contig	uous pages and a range		
<ol> <li>Under <i>Page range</i>, select <i>Pages</i></li> <li>Type the page numbers, separating the noncontiguous pages by commas and the range by a hyphen</li> </ol>	Page range O <u>All</u> O Current page O Selection O Pages: 3,5,12-14		
Printing a section of your	r document		
<ol> <li>Under <i>Page range</i>, select <i>Pages</i></li> <li>Type s and the section number</li> </ol>	Page range O <u>All</u> O Curr <u>e</u> nt page O Selection • Pages: s2		

### **Printing non-contiguous sections**

- 1. Under Page range, select Pages
- 2. Type **s** and the section number for each section separated by commas.

# Printing a range of pages that crosses sections

Page range

O Current page

Pages: s3,s5

O Selection

- 1. Under *Page range*, select **Pages**
- Reference the pages and their respective sections by typing p before the page number and s before the section number
   Place a hyphen between the beginning page/section and the ending page/section.

### 3.10 Spell Checks:

By default, *Spell Check* is automatically on whenever an Office program is open. When you turn this feature off, *Spell Check* will not run as you work on your document. The feature can be easily activated using the *Options* dialog box. You can also check the spelling in a document after you are finished typing.

- 1. From the *Tools* menu, select *Options*... The *Options* dialog box appears.
- 2. Select the Spelling & Grammar tab
- 3. Under Spelling, select Check spelling as you type
- Click OK Misspelled words appear underlined with a wavy red line. NOTE: This feature marks spelling errors; it does not correct them.

Modifying the Dictionary

Modifying text in a dictionary can be useful so that *Spell Check* does not mark certain words and names as misspelled. To remove words from or add words to from a dictionary, you must first open the dictionary from the *Custom Dictionaries* dialog box. Your changes to the dictionary are then saved for future use.

- 1. From the *Tools* menu, select *Options*... The *Options* dialog box appears.
- 2. Select the Spelling & Grammar tab
- 3. Click **CUSTOM DICTIONARIES...** The *Custom Dictionaries* dialog box appears.

- 4. From the *Dictionary list* scroll box, select the dictionary to be modified
- 5. Click MODIFY...

The *Custom Dictionary* appears. If this is your first time modifying the dictionary, the list will contain no items.

- 6. To add words to the dictionary,
  - a. In the *Word* text box, type the word to be added
  - b. Click ADD

The word appears in the *Dictionary* scroll box.

- 7. To delete words from the dictionary,
  - a. Select the word(s) to be deleted
  - b. Click **DELETE** The word(s) disappears from the *Dictionary* scroll list.
- 8. When finished, click **OK**
- 9. Click OK
- 10. To return to your Office program, click OK

#### Correcting Spelling

When the dictionary recognizes a word as misspelled, the word is underlined with a wavy red line. You can correct misspelled text through the *Quick* menu or through a dialog box. For words that are often misspelled or mistyped, you may use <u>AutoCorrect</u> to automatically correct the mistakes as they are typed.

For information on correcting grammar, refer to Word 2003: Working with Grammar Check.

### **Correcting Spelling: Quick Menu Option**

Using the *Quick* menu to modify misspelled text allows you to manage your misspelled word(s) quickly and easily.

1. Right click the misspelled word » select the appropriate option:

Quick Menu Option	Action
Spelling Suggestions	Gives word choices as spelling suggestions for the misspelled word.
Ignore All	Ignores that word and every other instance of that word.
Add to Dictionary	Adds the word to the custom dictionary.
<u>AutoCorrect</u>	Provides word choices for the automatic correction of the misspelled word.
Language	Allows the misspelled word to be corrected according to the selected language.
Spelling	Opens the <i>Spelling and Grammar</i> dialog box, which allows you to change the misspelled word.

### **Correcting Spelling: Dialog Box Option**

Using the dialog box option is a little more time-consuming, but you have more options for correcting misspelled words.

1. From the *Tools* menu, select *Spelling and Grammar...* OR

Click SPELLING AND GRAMMAR OR Press [F7]

Spelling and Grammar:	English (U.S.)		×
Not in Dictionary:			
Uwe		<b>▲</b>	Ignore Once
			Ignore All
		•	Add to Dictionary
Suggestio <u>n</u> s:			
UWEC			⊆hange
Ove Fwe			Change All
Awe		T	AutoCorrect
Check grammar			
Check grammar	Options	Undo	Cancel

The Spelling and Grammar dialog box appears.

2. Make the desired selection for each misspelling

NOTE: The dialog box options include all *Quick* menu options in addition to the options described in the following table.

Dialog Box Option	Action
Change	Changes the word to the selected suggestion.
Change All	Changes all identical misspellings to the selected suggestion.
AutoCorrect	Changes the word in the current document and continues to make this correction in the future.

3. When Spell Check is complete, in the dialog box that appears, click OK

#### **3.11 Headers and Footers**

The **header and footer** usually contain title and author information, dates, and page numbers. The **header** appears at the top of the page, while the **footer** appears at the bottom of the page.

#### To insert a header and footer:

- Click **View** on the menu bar.
- Select Header and Footer.

- The document will appear grayed out with a dotted Header and Footer box showing at the top and bottom of the page.
- **Locate** the Header and Footer toolbar on the page.

 Header and Footer
 Insert AutoText •
 Image: Ima

The Header and Footer toolbar

The **Header and Footer toolbar** contains buttons that can help you automatically enter important information in your header and footers.

#### Some of the useful features located on the Header and Footer Toolbar are:

- **Insert Auto-Text**: This drop-down menu shows commonly used header and footer information, including, author, page number, and date.
- **Insert Page Numbers**: This feature inserts page numbers.
- **Insert Number of Pages**: This inserts the number of pages in the entire document.
- Format Page Number: This opens the Page Number Format dialog box, so you can format your page number in the header and footer.
- Insert Date.
- Insert Time.
- **Page Setup**: This opens the **Page Setup dialog box**, so you can adjust the location of the header and footer.
- **Switch between Header and Footer**: This allows you to jump quickly between the header and footer on a page.
- **Close**: This closes the Header and Footer toolbar.



Deleting headers and footers

If you choose to delete your header or footer, Word will automatically delete the header or footer within the entire document.

#### To delete the header or footer:

- Click **View** on the menu bar.
- Select Header and Footer.
- **Highlight** the text within the header or footer (whichever text you would like to delete).
- Press **Delete**. The text is now removed.
- Click Close.

 $\checkmark$  You can delete the header and footer on just the first page of the document by choosing File and then Page Setup. In the Page Setup dialog box, choose the Layout Tab and place a check mark next to Different First Page under Headers and Footers, then click OK.

#### 3.12 Mail merge Features of Word

### To use Mail Merge:

- Select **Tools** on the main menu.
- Select Letters and Mailings -> Mail Merge.

The Mail Merge task pane appears and will guide you through the six main steps to complete a mail merge. You will have several decisions to make during the process. The following is an example of how to create a form letter and merge the letter with a data list.

### Steps 1-3

- Choose the type of document you wish to create. In this example, select Letters.
- Click **Next:Starting document** to move to Step 2.
- Select Use the current document.
- Click **Next:Select recipients** to move to Step 3.
- Select the **Type a new list** button.
- Click **Create** to create a data source. The **New Address List** dialog box appears.

### To edit a new address list:

- Click **Customize** in the dialog box. The Customize Address List dialog box appears.
- Select a fieldand click **Delete**.
- Click **Yes** to confirm that you wish to delete the field.
- Continue to delete any unnecessary fields.
- Click **Rename**. The Rename Field dialog box appears.
- Enter the new name you would like to give the field in the **to:** field.
- Continue to rename any fields necessary.
- Click **OK** to close the Customize Address List dialog box.
- Enter the necessary data in the New Address List dialog box.
- Click **New Entry** to enter another record.
- Click **Close** when you have entered all your data records.
- Enter the file name you wish to save the data list as.
- Choose the location where you wish to save the file.
- Click **Save**. The Mail Merge Recipients dialog box appears and displays all data records in the list.
- Confirm that the data list is correct, then click **OK**.
- Click **Next:Write your letter** to move to Step 4.

### Steps 4-6

• Write a letter in the current Word document. Stop writing when you reach a place in the letter where you wish to enter a field from your data record.

### To insert data from a data list:

- Click the **Insert Merge Fields** button. The Insert Merge fields dialog box appears.
- Select the field where you would like to insert in the document.
- Click **Insert**. Notice that a placeholder appears where information from the data record will eventually appear.
- Repeat these steps each time you need to enter information from your data record.
- Click **Next: Preview your letters** in the task pane once you have completed your letter.
- Preview the letters to make sure information from the data record appears correctly in the letter.
- Click Next: Complete the merge.
- Click **Print** to print the letters.
- Click All.
- Click **OK** in the Merge to Printer dialog box.
- Click **OK** to send the letters to the printer.

The Mail Merge Wizard allows you to complete the mail merge process in a variety of ways. The **best** way to learn how to use the different functions in Mail Merge is to try to develop several of the different documents—letters, labels, and envelopes—using the different types of data sources.

### Summary

The sailed features in Word-Processing package are their ability:

- Create, open and save the documents
- Cut, copy and page the required text partly or wholly in the same document or into another document
- forma the document by using the different commands available in the tool box like enhancing the font size, giving the spaces in between the characters and giving spaces between the lines, coloring the text and high lighting the importance text etc.
- Represent the text matter in the form of a bulleted or numbered list to see the text in an attractive and legible way
- Insert paragraph margins and sizes of the text depending on the page layout

- Also, able to divide the paragraphs into multiple columns at the required spaces on the page.
- The creation of table with options, insert table, draw table and table wizard, formatting one table by using formatting/auto format options, modifying a table and to convert the text to table and vice versa.
- The printing of a document is done by using print option with page settings, page layout, and number of copies options.
- Check spelling mistakes and grammar of the text by using spell check and grammar options.
- Including header and footers in text in different styles.
- Using mail merge features.

### **Short Answers Type Questions**

- 1. Give the steps you take to save a document.
- 2. List the sequential steps you take to select a part of a given text.
- 3. Write the steps you take
  - a. To copy
  - b. To paste

Selected document into another document.

- 4. Give the steps you take to change the margins from with the page setup dialog box.
- 5. Mention the steps you create basic headers and footers in a document.
- 6. How can you modify an assigned bullet or number to a text?
- 7. What are the different text alignments used in word?
- 8. List the different options to create a table.
- 9. What are the word cell refers to?
- 10. In a table how a new row be inserted.
- 12. Write steps to merge to cells in a table.
- 13. What is splitting table.
- 14. How the width of a row in a table is changed?
- 15. How the height of a column is changed?
- 16. What is the procedure to delete a row?
- 17. What is the procedure to delete a column?

- 18. How do you correct the text automatically?
- 19. What are two different page layouts options in printing option?
- 20. In "Spell Check" dialogue box what are the different options available?
- 21. In "Grammar Check" dialogue box what are the different options available?
- 22. What are Header and Footer?
- 23. How to create headers and footers for odd and even pages using word processing language?

24. How to create the different headers and footers for the first page using word processing package?

- 25. How we can insert page numbers in headers and footers?
- 26. What is mail-Merge in word processing package?
- 27. What are the two different things to be created while doing Mail-Merge?
- 28. How to create a new data source?
- 29. How to open an existing data Source?
- 30. What is Mail-Merge Help-Dialogue box?
- 31. How to merge the data source with the Mail Document?

#### Long Answers Type Question

- 1. What is a word processing?
- 2. What are the advantages of using a word processor?
- 3. What are the various forms of a document?
- 4. List some of the word proofing tools.
- 5. Explain the terms "BULLETS".
- 6. Mention the different text alignments used in word.
- 7. Explain the word wrap facility in word wrap.
- 8. What is the use of over write mode in word?
- 9. List different types of word processors.

10. Explain the procedure of "creating table" in word processing package by (I) Insert Table option (ii) table wizard option.

11. How to change the format of a table by using table format option and what is table auto format?

12. It is possible to use simple arithmetic operations in a table. If so, explain the procedure to find the sum of arrow and average of a column.

13. What is the procedure to check the spelling in a document by using "Spell check and Grammar" option.

14. What are headers and footers? Explain the procedure to place headers and footers to the text in the following two methods.

- I. Headers and Footers for odd and even pages.
- ii. Headers and Footers for the first page.

15. What is Mail Merge? How a word processing package works with this feature?

16. How to create a new data source from Mail merge help dialogue box? And explain the procedure to enter the data in the created data source.

17. How to merge a main document with a data source to get Mail Merge? Explain.

18.Write a procedure to send the same invitation to four different addresses by using "Mail-Merge" feature of word processing package.

#### **Objective Type Questions**

1.----- is defined as enhancing or improving the look of the document.

2.MS-Word automatically attaches the ----- extension to documents.

3.----- and ----- are proof reading tools.

4. Replacing the existing characters with new ones is referred to as ------

5. The ----- and ----- options allow you to make a duplicate copy of text in the document.

6. The p----- feature pushes the words going beyond the right most boundary a to the next line.

7. The process of breaking long sentences into points is referred to as ------.

8. ----- is the left limit of the page and marks the beginning of the line.

9. In ----- type of alignment, text gets aligned along with left and right margins.

10.The ----- option gives us an idea of how the document would look when printed.

11.Orientation of a page can either ----- or ----- or -----

### **Keys toObjective Questions**

(1). Format (2). .doc (3). Spelling and grammar (4). Find and Replace (5). Copy and Paste (6). Word wrapping (7). Bullets (8). Left margin (9). Justify (10). Print preview (11). Footnote or end note continuation.

### UNIT IV

### **Structure:**

- 4.1 Introduction of Worksheet
- 4.2 Creating a Work book
- 4.3 Rows and Columns in Worksheet
- 4.4 Use of Formulae in the worksheet
- 4.5 Preparing a simple worksheet
- 4.6 Functions
- 4.7 Charts
- 4.8 Creating a Chart

### Learning Objectives:

On completion of this unit, a learner will be able to:

- Explain the basic features of worksheet package and its utility in Information Technology
- State the components of worksheet viz., cells, rows, columns
- Describe the method of creating, opening, saving and closing worksheet
- Explain the procedure of copying, moving data in the worksheet
- Describe the methods of inserting cells, rows and columns in a worksheet
- Describe the types of functions
- List the types of charts
- Describe the methods of creating and editing charts
- Describe the procedure for creating and placing graphic objects

### **4.1 Introduction to Worksheet:**

Although knowledge of how to navigate in a Windows environment is helpful, this tutorial was created for the computer novice. To begin, open Microsoft Excel. Then, if necessary, click the  $\times$  in the upper right corner of the task pane to close the task pane.

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The Title Bar

Microsoft Excel - Book1

You will start with the Title bar, which is located at the very top of the screen. On the Title bar, Microsoft Excel displays the name of the workbook you are currently using. At the top of your screen, you should see "Microsoft Excel - Book1" or a similar name.

The Menu Bar

🐏 Eile Edit View Insert Format Tools Data Window Help 🗉 🖉 🗙

The Menu bar is directly below the Title bar. The menu begins with the word File and continues with Edit, View, Insert, Format, Tools, Data, Window, and Help. You use a menu to give instructions to the software. Point with your mouse to a menu option and click the left mouse

button. A drop-down menu opens. You can now use the left and right arrow keys on your keyboard to move left and right across the Menu bar. You can use the up and down arrow keys to move up and down the drop-down menu. To choose an option, highlight the item on the drop-down menu and press Enter. An ellipse after a menu item signifies additional options; if you choose that option, a dialog box opens.

Do the following exercise, which demonstrates using the Microsoft Excel menu bar.

- 1. Point to the word File, which is located on the Menu bar.
- 2. Click your left mouse button.
- 3. Press the right arrow key until Help is highlighted.
- 4. Press the left arrow key until Format is highlighted.
- 5. Press the down arrow key until Style is highlighted. Press the up-arrow key until Cells is highlighted.
- 6. Press Enter to choose the Cells menu option.
- 7. Point to Cancel and click the left mouse button to close the dialog box.

When using Microsoft Excel, you can set an option to tell Microsoft Excel to always show full menus or to show only the most frequently and recently used options. All the lessons in this tutorial assume you have your menus set to Always Show Full Menus. To set your menu to display full menus:

- 1. Point to the word Tools, which is located on the menu bar.
- 2. Click your left mouse button.
- 3. Press the down arrow until customize is highlighted.
- 4. Press Enter.
- 5. Choose the Options Tab by clicking on it.
- 6. If Always Show Full Menus does not have a check mark in it, click in the Always Show Full Menus box.
- 7. Click Close to close the dialog box.

Toolbars



Toolbars provide shortcuts to menu commands. Toolbars are generally located just below the Menu bar. Before proceeding with this lesson, make sure the toolbars you will use -- Standard and Formatting -- are available. Follow the steps outlined here:

- 1. Point to View, which is located on the Menu bar.
- 2. Click the left mouse button.
- 3. Press the down arrow key until Toolbars is highlighted.

- 4. Press the right arrow key.
- 5. Both Standard and Formatting should have a check mark next to them. If both have a check mark next to them, press Esc two times to close the menu. If either does not have a check mark, press the down arrow key until Customize is highlighted.
- 6. Press Enter. The Customize dialog box opens.
- 7. Choose the Toolbars tab.
- 8. Point to the box or boxes next to the unchecked word or words, Standard and/or Formatting, and click the left mouse button. A check mark should appear. Note: You turn the check mark on and off by clicking the left mouse button.
- 9. Point to Close and click the left mouse button to close the dialog box.

Worksheets



Microsoft Excel consists of worksheets. Each worksheet contains columns and rows. The columns are lettered A to IV; the rows are numbered 1 to 65536. The combination of a column coordinate and a row coordinate make up a cell address. For example, the cell located in the upper left corner of the worksheet is cell A1, meaning column A, row 1. Cell E10 is located under column E on row 10. You enter your data into the cells on the worksheet.

The Formula Bar



If the Formula bar is turned on, the cell address displays in the Name box on the left side of the Formula bar. Cell entries display on the right side of the Formula bar. Before proceeding, make sure the Formula bar is turned on.

- 1. Point to View, which is located on the Menu bar.
- 2. Click the left mouse button. A drop-down menu opens. On the drop-down menu, if Formula Bar has a check mark next to it, the Formula bar is turned on. Press the Esc key to close the drop-down menu.
- 3. If Formula Bar does not have a check mark next to it, press the down arrow key until Formula Bar is highlighted; then press Enter. The Formula bar should now appear below the toolbars.
- 4. Note that the current cell address displays on the left side of the Formula bar.

The Status Bar

Ready NUM

### Status Bar

If the Status bar is turned on, it appears at the very bottom of the screen. Before proceeding, make sure the Status bar is turned on.

- 1. Point to View, which is located on the Menu bar.
- 2. Click the left mouse button. A drop-down menu opens.
- 3. On the drop-down menu, if Status Bar has a check mark next to it, it is turned on. Press the Esc key to close the drop-down menu.
- 4. If Status Bar does not have a check mark next to it, press the down arrow key until Status Bar is highlighted; then press Enter. The Status bar should now appear at the bottom of the screen.

Notice the word "Ready" on the Status bar at the lower left side of the screen. The word "Ready" tells you that Excel is in the Ready mode and awaiting your next command. Other indicators appear on the Status bar in the lower right corner of the screen. Here are some examples:

The Num Lock key is a toggle key. Pressing it turns the numeric keypad on and off. You can use the numeric keypad to enter numbers as if you were using a calculator. The letters "NUM" on the Status bar in the lower right corner of the screen indicate that the numeric keypad is on.

• Press the Num Lock key several times and note how the indicator located on the Status bar changes.

The Caps Lock key is also a toggle key. Pressing it turns the caps function on and off. When the caps function is on, your entry appears in capital letters.

• Press the Cap Lock key several times and note how the indicator located on the Status bar changes.

Other functions that appear on the Status bar are Scroll Lock and End. Scroll Lock and End are also toggle keys. Pressing the key toggles, the function between on and off. Scroll Lock causes the movement keys to move the window without moving the cell pointer. End lets you jump around the screen. We will discuss both later in more detail.

Make sure the Scroll Lock and End indicators are off and complete the following exercises.

The Down Arrow Key

#### INTRODUCTION TO COMPUTER SYSTEM

You can use the down arrow key to move downward one cell at a time.

- 1. Press the down arrow key several times.
- 2. Note that the cursor moves downward one cell at a time.

The Up Arrow Key

You can use the Up-Arrow key to move upward one cell at a time.

- 1. Press the up-arrow key several times.
- 2. Note that the cursor moves upward one cell at a time.

The Tab Key

You can use the Tab key to move across the page to the right, one cell at a time.

- 1. Move to cell A1.
- 2. Press the Tab key several times.
- 3. Note that the cursor moves to the right one cell at a time.

The Shift Tab Keys

You can hold down the Shift key and then press the Tab key to move to the left, one cell at a time.

- 1. Hold down the Shift-key and then press Tab.
- 2. Note that the cursor moves to the left one cell at a time.

The Right and Left Arrow Keys

You can use the right and left arrow keys to move right or left one cell at a time.

- 1. Press the right arrow key several times.
- 2. Note that the cursor moves to the right.
- 3. Press the left arrow key several times.
- 4. Note that the cursor moves to the left.

### Page Up and Page Down

The Page Up and Page Down keys move the cursor up and down one page at a time.

- 1. Press the Page Down key.
- 2. Note that the cursor moves down one page.
- 3. Press the Page Up key.
- 4. Note that the cursor moves up one page.

The End Key

Ready

The Status Bar

END

NUM

The End key, used in conjunction with the arrow keys, causes the cursor to move to the far end of the spreadsheet in the direction of the arrow.

- 1. Press the End key.
- 2. Note that "END" appears on the Status bar in the lower right corner of the screen.
- 3. Press the right arrow key.
- 4. Note that the cursor moves to the farthest right area of the screen.
- 5. Press the END key again.
- 6. Press the down arrow key. Note that the cursor moves to the bottom of the screen.
- 7. Press the End key again.
- 8. Press the left arrow key. Note that the cursor moves to the farthest left area of the screen.
- 9. Press the End key again.
- 10. Press the up-arrow key. Note that the cursor moves to the top of the screen.

Note: If you have entered data into the worksheet, the End key moves you to the end of the data area.

The Home Key

The Home key, used in conjunction with the End key, moves you to cell A1 -- or to the beginning of the data area if you have entered data.

- 1. Move the cursor to column J.
- 2. Stay in column J and move the cursor to row 20.
- 3. Press the End key.
- 4. Press Home.
- 5. You should now be in cell A1.

Moving Quickly Around the Worksheet

The following are shortcuts for moving quickly from one cell to a cell in a different part of the worksheet.

Go to -- F5

The F5 function key is the "Go To" key. If you press the F5 key while in the Ready mode, you are prompted for the cell to which you wish to go. Enter the cell address, and the cursor jumps to that cell.

- 1. Press F5. The Go To dialog box opens.
- 2. Type J3.
- 3. Press Enter. The cursor should move to cell J3.

Go to -- Ctrl-G

You can also use Ctrl-G to go to a specific cell.

- 1. Hold down the Ctrl key while you press "g" (Ctrl-g). The Go To dialog box opens.
- 2. Type C4.
- 3. Press Enter. You should now be in cell C4.

### Name Box

You can also use the Name box to go to a specific cell.



- 1. Type B10 in the Name box
- 2. Press Enter. Excel moves to cell D10.

Selecting Cells

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If you wish to perform a function on a group of cells, you must first select those cells by highlighting them. To highlight cells A1 to E1:

- 1. Place the cursor in cell A1.
- 2. Press the F8 key. This anchors the cursor.
- 3. Note that "EXT" appears on the Status bar in the lower right corner of the screen. You are in the Extend mode.
- 4. Click in cell E7. Cells A1 to E7 should now be highlighted.
- 5. Press Esc and click anywhere on the worksheet to clear the highlighting.

Alternative Method: Selecting Cells by Dragging

You can also highlight an area by holding down the left mouse button and dragging the mouse over the area. In addition, you can select noncontiguous areas of the worksheet by doing the following:

- 1. Place the cursor in cell A1.
- 2. Hold down the Ctrl key. Do not release it until you are told. Holding down the Ctrl key enables you to select noncontiguous areas of the worksheet.
- 3. Press the left mouse button.
- 4. While holding down the left mouse button, use the mouse to move from cell A1 to E7.
- 5. Continue to hold down the Ctrl key but release the left mouse button.
- 6. Using the mouse, place the cursor in cell G8.
- 7. Press the left mouse button.

- 8. While holding down the left mouse button, move to cell I17. Release the left mouse button.
- 9. Release the Ctrl key. Cells A1 to E7 and cells G8 to I17 are highlighted.
- 10. Press Esc and click anywhere on the worksheet to remove the highlighting.

Entering Data

In this lesson, you are going to learn how to enter data into your worksheet. First, you place the cursor in the cell in which you would like to enter data. Then you type the data and press Enter.

- 1. Place the cursor in cell A1.
- 2. Type John Jordan.
- 3. The Backspace key erases one character at a time. Erase "Jordan" by pressing the backspace key until Jordan is erased.
- 4. Press Enter. The name "John" should appear in cell A1.



Editing a Cell

After you enter data into a cell, you can edit it by pressing F2 while you are in the cell you wish to edit.

- 1. Move the cursor to cell A1.
- 2. Press F2.
- 3. Change "John" to "Jones."
- 4. Use the backspace key to delete the "n" and the "h."
- 5. Type nes.
- 6. Press Enter.

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Alternate Method: Editing a Cell by Using the Formula Bar

You can also edit the cell by using the Formula bar. You can change "Jones" to "Joker" as follows:

- 1. Move the cursor to cell A1.
- 2. Click in the formula area of the Formula bar.

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- 3. Use the backspace key to erase the "s," "e," and "n."
- 4. Type ker.
- 5. Press Enter.

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Alternate Method: Editing a Cell by Double-Clicking in the Cell

You can change "Joker" to "Johnson" as follows:

1. Move the cursor to cell A1.

- 2. Double-click in cell A1.
- 3. Press the End key. Your cursor is now at the end of your text.
- 4. Use the backspace to erase "r," "e," and "k."
- 5. Type hnson.
- 6. Press Enter.



Changing a Cell Entry

Typing in a cell while you are in the Ready mode replaces the old cell entry with the new information you type.

- 1. Move the cursor to cell A1.
- 2. Type Cathy.
- 3. Press Enter. The name "Cathy" should replace "Johnson."



Wrapping Text

When you enter text that is too long to fit in a cell into a cell, it overlaps the next cell. If you do not want it to overlap the next cell you can wrap the text.

- 1. Move to cell A2.
- 2. Type Text too long to fit.
- 3. Press Enter.
- 4. Return to cell A2.
- 5. Choose Format >Cells from the menu.
- 6. Choose the Alignment tab.

- 7. Click Wrap Text.
- 8. Click OK. The text wraps.

### Deleting a Cell Entry

To delete an entry in a cell or a group of cells, you place the cursor in the cell or highlight the group of cells and press Delete.

- 1. Place the cursor in cell A2.
- 2. Press the Delete key.

Entering Numbers as Labels or Values

In Microsoft Excel, you can enter numbers as labels or as values. Labels are alphabetic, alphanumeric, or numeric text on which you do not perform mathematical calculations. Values are numeric text on which you perform mathematical calculations. If you have a numeric entry, such as an employee number, on which you do not perform mathematical calculations, enter it as a label by typing a single quotation mark first.

Enter a number:

- 1. Move the cursor to cell B1.
- 2. Type 100.
- 3. Press Enter.

The number 100 appears in cell B1 as a numeric value. You can perform mathematical calculations using this cell entry. Note that by default the number is right-aligned.

Enter a value:

- 1. Move the cursor to cell C1.
- 2. Type '100.
- 3. Press Enter.

The number 100 appears in cell C1 as a label. Note that by default the cell entry is left-aligned and a green triangle appears in the upper left corner of the cell.

### Smart Tags

When you make an entry that Microsoft Excel believes you may want to change, a smart tag appears. Smart tags give you the opportunity to make changes easily. Cells with smart tag in them appear with a green triangle in the upper left corner. When you place your cursor in the cell, the Trace Error icon appears. Click the Trace Error icon and options appear. When you made your entry in cell C1 in the previous section, a smart tag should have appeared.

- 1. Move to cell C1.
- 2. Click the Trace Error icon. An options list appears. You can convert the label to a number, obtain help, ignore the error etc.

Saving a File

This is the end of Lesson1. To save your file:

- 1. Choose File >Save from the menu.
- 2. Go to the directory in which you want to save your file.

- 3. Type lesson1 in the File Name field.
- 4. Click Save.

Closing Microsoft Excel Close Microsoft Excel.

1. Choose File >Close from the menu.

### **Summary**

- The basic components and features of worksheet package using the software package MS-Excel include.
- The components of the worksheet, such as, rows, columns, cells etc.
- Creating, opening, saving and closing workbook is carried out by making use of the provided options.
- Copying, moving data from one place to another in a worksheet or in a workbook is possible
- Inserting cells or rows or columns in a worksheet whenever data is to be inserted.
- By adjusting column width or row height the data in the cells can be fit in the space.
- Entering formulae which are helpful in calculations and analyzing data.
- Availing excel page set-up feature to format the page.
- Working with multiple worksheets
- The components of the worksheet such as cells, rows and columns.
- Creating, opening, saving and closing workbook carried out by my making use of file option in the menu bar.
- By selecting cells, copying, moving data from one place to another in a worksheet is done through drag and drop method and through short cut menu.
- Cells and rows and/or columns can be inserted anywhere in the worksheet by selecting insert option from the menu bar.
- Column width and/or row height can be adjusted or using mouse the data in the cells by format option or using mouse.
- Formulas can be entered whenever calculations are required.
- Excel page-set up feature allows to format the page how it looks at printing.
- Working with multiple worksheets involves inserting a new worksheet and/or moving different worksheets which can be carried out by selecting worksheet tabs at the bottom.
- Worksheet package MS-Excel provides large collection of functions for different categories of information/data like text, math, logical, date and time, look up and reference etc.
- Function wizard guides one at each step to enter the functions.
- Charts can be drawn using chart wizard.
- Charts can be resized and moved in the worksheet at appropriate places.

- Editing of chart type, pattern, color, and text font can be done using editing procedures.
- Once the chart is selected most of the menu command are displayed in relation to charts only.
- Short cut menu can be used to insert data labels, legends, and to select the chart type.
- Build-in formats and user defined formats can be used to for quick and easy formatting of the charts.
- Charts are very useful tools to analyses data.
- Embedded charts as well as chart sheets can be printed.

### **Short Answer Type Questions**

- 1. What is a cell? How many rows and columns are available in MS-Excel worksheet?
- 2. Give the procedure for creating as workbook of the file in MS-Excel.
- **3.** Describe how a blank row can be inserted in a worksheet.
- 4. Give the procedure to insert a worksheet between two worksheets in a workbook.
- **5.** Explain the procedure for saving a workbook.
- 6. Explain four statistical functions in EXCEL.
- 7. Write a short note on embedded charts, chart sheets.
- 8. How to edit charts?
- 9. How to change chart type?

### Long Answer Type Question

1. What are the different types of operators used in formulas and their order of precedence.

2. Explain Excel page setting feature in details.

3. (a) Write a formula to calculate DA as 70% of basic of available in E3 cell. Result should be displayed in F3 cell.

(b) Give the procedure to copy the formula from F3 to F4.... F10 cells in the worksheet.

4. What are the different types of functions in EXCEL discuss?

5. How to use FUNCTION WIZARD explain?

6. What are the different types of charts provided in EXCEL worksheet package?

7. What are the steps required to create a chart? Explain in detail.

### **Objective Type of questions**

1. The address of the first cell in the worksheet.

- 2.Formatting of the page can be done using ----- option. How to exit from excel?
- 3. A formula in Excel should begin with -----.
- 4. Select ------ option from edit menu to move the range of cells.
- 5. Which function is used to find the maximum value in a given list.

(a) MAX (b) LARGE (c)MIN (d)SMALL

6. Which function is used to display current data

	(a)DATA	(b)DAY	(c)WEEKDAY	(d)NOW ()					
7. Whi	ch function is used to	o display the integer pa	rt of a given number						
	(a)ROUND	(b)TRUNCATE	(c)ABS	(d)INT					
8. Wh	nich chart doesn't pro	vide move than one y-a	axis data range						
	(a) LINE	(b) PIE	(c) AREA	(d) BAR					
9. In v	9. In which chart x-axis must have a numeric value								
	(a) LINE	(b) PIE	(c) AREA	(d) XY					

## Key to the Objective Questions

(1) Key (A1)	(2) Key (page set up)	(3) Key (=)
(4) Key (cut)	(5) a	(6) d
(7) d	(8) b	(9) d

#### UNIT V

#### **Structure:**

- 5.1 Introduction
- 5.2 MS Power point
- 5.3 Presentation
- 5.4 Entering and editing text
- 5.5 Inserting Picture
- 5.6 Background of the slide
- 5.7 Animating an object
- 5.8 Slide transition effect

#### **Learning Objectives:**

On competition of this unit, a learner will be able to:

- Explain the features of power point presentation
- Explain the method of Entering and Editing text
- Describe the method of Inserting Pictures
- Explain the method of changing the background of the slide and animating an object
- Explain Slide Transition Effects

### **PowerPoint Overview**

When you start PowerPoint, PowerPoint displays the Title Slide in the Slide pane. You can type the title of your presentation and a subtitle on this side. To enter text on the Title Slide:

- Click and type the title of your presentation in the "Click to add title" area.
- Click and type a subtitle in the "Click to add subtitle" area.

If you do not wish to use the Title Slide, choose Edit > Delete slide from the menu to delete it. Create New Slides

After completing your title slide, you can create additional slides. To create a new slide:

- 1. Do one of the following:
- Choose Insert > New Slide from the menu.
- Click the New Slide button  $\Box \underline{N} = \underline{N} = \underline{N}$ .
- Press Ctrl-M.

The Apply Slide Layout pane will appear on the right side of the screen. The Apply Slide Layout pane provides you with slide templates you can use when creating your PowerPoint presentation. There are four types of Text Layout templates.

Title Slide - The Title Slide contains two text placeholders that you can use to display a title and a subtitle of your presentation.

Title Only - The Title Only slide contains a single placeholder. You can use it to display a title.

Title and Text - The Title and Text template provides a placeholder for a title and a placeholder for text.

Title and 2 Column Text - The Title and Text template provides a placeholder for a title and two placeholders for text.

2. To select a layout, click the layout you want in the Apply Slide Layout pane. The layout will then appear in the Slide pane.



3. To add text, click inside the placeholder and type.

4. To add an additional slide to your presentation, do one of the following:

- Right-click on the slide layout. A menu will appear. Choose Insert New Slide.
- Click the down arrow next to the slide layout. A menu will appear). Choose Insert New Slide.

🔄 <u>N</u>ew Slide 🖕

Change Your Slides

After creating a slide, if you want to add text:

- 1. Place the cursor at the point at which you would like to add text.
- 2. Type the information you want to add.

If you would like to change text:

- 1. Highlight the text you want to change.
- 2. Type the new text.

You can use the backspace key to delete text. You can also delete text by highlighting the text and pressing the Delete key.

Apply a Design Template Design templates provide attractive backgrounds for your PowerPoint slides. To apply a design template:

- 1. Do one of the following:
- Choose Format > Slide Design from the menu.
- Click the Slide Design icon

Design templates will appear on the right side of the screen.

- 2. To apply a design template to all the slides in your presentation do one of the following:
- Click on the design template. 0
- Right-click on the template. A menu will appear. Choose Apply to All Slides. 0
- Click on the down arrow next to the template. A menu will appear. Choose Apply 0 to All Slides.



Correct Spelling

Using the PowerPoint spell checker, you can check the spelling in you PowerPoint documents.

- 1. To start spell check, do one of the following:
- Choose Tools > Spelling from the menu. 0
- Press F7. 0
- Click the Spell Check icon. 0

If there are possible spelling errors, the Spelling dialog box will open.

Task	Procedure
Do not change spelling.	Click Ignore.
Correct spelling.	Click the correct spelling in the Suggestions box. Click Change.
Add to Dictionary.	Click Add.
Word is Correct. Do not change document.	Click Ignore All.
Word is incorrect. Change entire document.	Click Change All.

Sorter View

After you have created your PowerPoint slides, you can move, cut, copy, paste, duplicate, navigate, and view them in Sorter view. To view the slides in Sorter view, do one of the following:

- Choose View > Slide Sorter from the menu. 0
- С
- Click the Slide Sorter View icon.



Slide Sorter View		
Task	Procedure	
Move to first slide.	Ctrl-Home	
Move to last slide.	Ctrl-End	
Move to next slide.	Right arrow	
Move to previous slide.	Left arrow	
Select a slide.	Single-click	
Open slide in Normal view.	Double-click slide.	
Select slides.	Select a single slide:	
	Click the slide you want to select.	
	Select multiple slides:	
	Hold down Ctrl key.	
	Click the slides you want to select.	
Delete a slide.	Select the slide or slides you want to delete	
	Press the Delete key.	

Slide Sorter View		
Task	Procedure	
	Select the slide or slides you want to delete. Choose Edit > Delete Slide from the menu.	
Copy a slide.	Select the slide. Choose Edit > Copy from the menu.	
	Select the slide.	
	Click the copy icon.	
	Select the slide.	
	Press Ctrl-C.	
Paste a slide	Select the slide after which you want the new slide or slides to appear.	
	Choose Edit > Paste from the menu.	
	Select the slide after which you want the new slide or slides to appear.	
	Click the paste icon.	
	Select the slide after which you want the new slide or slides to appear.	
	Press Ctrl-V.	
Cut a slide	Select the slide or slides you want to cut.	
	Choose Edit > Cut from the menu.	
	Select the slide or slides you want to	
	cut. Click the Cut icon.	
	Select the slide or slides you want to cut.	
	Press Ctrl-X.	

Slide Sorter View		
Task	Procedure	
Move a slide	Select the slide or slides you want to move.	
	Drag to the new location.	
Duplicate a slide	Select the slide or slides you want to duplicate.	
	Choose Edit >Duplicate from the menu.	
	Select the slide or slides you want to duplicate.	
	Press Ctrl- D.	

Run Your PowerPoint Slide Show

Once you have created your slides, you can run your Slide Show:

- 1. Do any one of the following:
- Press F5.
- Choose Slide Show > View Show from the menu.
- Click the Slide Show icon, which is in the bottom left corner of your screen.

Your slideshow will appear on your screen.

Navigating the Slideshow	
Task	Procedure
Go to the next slide.	Do one of the following:
	Press the Right Arrow key.
	Press the Enter key.
	Press the Page Down key.
	Left-click
Go to the previous slide.	Do one of the following:
	Press the Left Arrow key.
	Press the Backspace key.
	Press the Page Up key.

Print Your Slides

PowerPoint provides you with many printing options. You can print a large view of your slides or you can print your slides as handouts with 1, 2, 3, 4, 6 or 9 slides per page. You can also print your Notes pages or the Outline view of your slides.

To print:

- 1. Choose File >Print Preview from the menu. The Print Preview area will open.
- 2. Click the down arrow next to the Print What field.
- 3. Select what you would like to print.
- 4. Click the Print icon. The Print dialog box will open.
- 5. Select whether you want your slides to print in color, grayscale, or black and white. If you are using a black and white printer, choose black and white. You will use less ink or toner.
- 6. Check whether you want your slides to print vertically or horizontally.
Creating Your First PowerPoint Presentation

The following exercise steps you through creating your first PowerPoint presentation.

Create a Title Slide

- 1. Open PowerPoint.
- 2. Choose Blank Presentation on the Task pane. You will be presented with a Title slide.



3. Enter the information shown here. Type College Scholarships and Financial Aid in the Click to Add Title text box. Type Paying for College in the Click to Add Subtitle text box.

# College Scholarships and Financial Aid

Paying for College

Insert a New Slide

- 1. Click the New Slide icon  $\Box \underline{New Slide}$ .
- 2. Click the Title and Text icon.



3. Enter the information shown here. Type Here is what to do: in the Click to Add Title area. Type the bulleted text in the Click to Add Text area.

# Here is what to do:

- Start saving early
- Apply for financial aid

Create a Hierarchy

- 1. Insert a new slide. Right-click the Title and Text icon. A context menu will appear. Choose Insert New Slide from the context menu.
- 2. Enter the information shown here. Click the Increase Indent icon to indent the bullets for Stafford Loans and PLUS Loans. If you ever need to decrease an indent, use the decrease indent icon .

# Where to Apply for Aid

- Pell Grants
- Work Study Programs
- Federal Loans
  - Stafford Loans
  - PLUS Loans

Use Two-Column Text

- 1. Right-click the Title and 2 Column Text icon. A context menu will appear. Choose Insert New Slide.
- 2. Enter the information shown here. Type the information in the appropriate column.



Apply a Design Template

- 1. Click the design icon Design templates will appear on the left side of the screen.
- 2. Scroll down to view the design templates.
- 3. Right-click the design template you want to apply. A context menu will appear. Choose Apply to All Slides. We used the Lock and Key design template.



Outline and Slides Tab

1. Use the Slides tab to view thumbnails of your slide.



2. Click the Outline tab to view the text of your presentation as an outline.



### Slide Sorter View

1. Choose View > Slide Sorter from the menu to move to Slide Sorter view.



2. Double-click a slide to return to Normal view.

Run Your Slide Show

- 1. Press F5 to run the Slide Show.
- 2. Use the arrow keys on your keyboard to move forward and backward through your slides.
- 3. Use the Esc key to return to Normal view.

Print Your Outline

- 1. Choose File > Print Preview from the menu.
- 2. Click the down arrow next to the Print What icon.



3. Select Outline view.



- 4. Click the Print icon.
- 5. Click Close.

Print Your Slides

- 1. Choose File > Print Preview from the menu.
- 2. Click the down arrow next to the Print What icon.
- 3. Select the slides you want to print.
- 4. Click the down arrow next to Options. A menu will appear.
- 5. Choose Color/Grayscale > Pure Black and White.

- 6. Click the Print icon.
- 7. Click Close.

Print Your Slides as a Handout

- 1. Choose File > Print Preview from the menu.
- 2. Click the down-arrow next to the Print What icon.
- 3. Select Handouts (2 Slides Per Page).
- 4. Click the Print icon.
- 5. Click Close.

Animating the work

### Adding your own artwork

When you animate an object, you add special visual or sound effects to it.

The following steps will show you how to animate a cartoon image while working in Slide View.

1. Click the Slide View button to go to Slide View.

2. On the slide, click the cartoon image to select it.

3. From the Slide Show menu, select Custo<u>m</u>Animation. The Custom Animation task pane will appear.



4. From the Custom Animation task pane, click the Add Effect button, select Entrance, then select Fly In.

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			*	<u>5</u> . Fly In	
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Give objects in your presentation a 'lift'

Another thing I can do is animate text. This is a great thing to do with titles and credits. For example, you can make text appear as if it is being typed letter by letter by a typewriter.



This is just blowing my mind. It looks like the title sequence from a movie or something!

### Animating Text

Try adding the typewriter effect to text on your slide.

1. In Slide View, select the text you want to animate by clicking it.

2. From the Slide Show menu, select Custo<u>m</u>Animation. The Custom Animation task pane will appear. Click the Add Effect button, select Entrance, then select More Effects.

3. The Add Entrance Effect dialog box will appear. Scroll down the list and click Color Typewriter. Then click OK.

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Moderate						
💉 Ascend	📌 Center Revolve					
📌 Color Typewriter	🚓 Compress					
🛷 Descend	💸 Ease In					
ar Grow & Turn	📌 Rise Up					
When was the last time you saw letters being typed?!!						

Can you also animate charts?



You know it. This is really an effective tool. Let's say you're doing a chart on how the ozone layer has been depleted in the past 100 years. You can have the chart start in 1900 and reveal the depletion year by year. By the time you reach the present year, revealing depletion at its worst, people will really understand your point.



Wow! What an impact. That ozone is heavy stuff. Does that mean I can't use hair spray?

Let's save that for another show. For today, let me show you how to animate the chart, instead.

### Animating a chart

You can make charts more interesting by animating them. In a Slide Show, an unanimated chart appears onscreen all at once. When you animate a chart, the chart appears "bit by bit". You specify the way the elements of the chart will appear in the Custom Animation dialog box.

Try animating a chart so that the elements of the chart are introduced onscreen by category.

1. In Slide View, click the chart you want to animate.

2. From the Slide Show menu, select Custo<u>m</u>Animation. The Custom Animation task pane will appear.



3. Click the Add Effect button and select an effect. In the task pane, click the arrow next to the effect you just selected. Select Effect Options and the Effects dialog box will appear.

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	0	Start <u>A</u> fter Previous		
	(	ffect Options	•	Click this to open
		[iming		the Effects dialog box

4. Click the Chart Animation tab, then select By Category. Click OK and the animation effect will be applied to the chart.

Checkerboard
Effect Timing Chart Animation
Group chart: As one object 🛛 💌
Animate g As one object By series
By category
By element in category

How would you like items to be introduced?



Let's say I create this cool sequence where my banner flies in, then my charts, then some text, then a flying pig. What happens if I want to change the order? What if I want the pig to fly in first?

Hey, you're the director and you get to make those choices. With PowerPoint you have complete control over animation order.

### Changing animation order

Normally, the object that is animated first appears first, but you can rearrange the order. Here's what you do:

1. Click the object you want to change. For example,

the flying pig.

2. From the Custom Animation task pane, click the animation effect you want to edit. Now drag the animation effect to the position you want it to appear.

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Modify: Che	ckerboard	Modify: Checkerboard		
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Direction:	Across 🔽	Direction:	Across 🐱	
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#### **BEFORE** move the effect

AFTER moving the effect



Okay, I've reordered the animation. Now, how can I preview it to make sure it works right?

### Previewing an animation

PowerPoint lets you preview animation settings for your current slide without running the entire slide show.

1. In Slide View, go to the slide you want to preview.

2. Click the Sli<u>d</u>e Show menu, then click Custo<u>m</u> Animation.



The Custom Animation task pane will appear. Click the Play button to see a preview.

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### UNIT VI

### **Usage of Internet**

### **Structure:**

6.1 Introduction

6.2 Creating user account on the internet and email

6.3 Sending a document to a given email address

6.4 Attaching a file to a message

6.5 Searching and downloading the content from internet

### **Learning Objectives:**

On competition of this unit, you will be able to

- Creating User account on the internet and email
- Sending a document to a given email address
- Searching the topics using search engine
- Downloading the content from Internet

**6.1 Introduction:** The Internet is a global network of billions of computers and other electronic devices. With the Internet, it's possible to access almost any information, communicate with anyone else in the world, and do much more.

You can do all of this by connecting a computer to the Internet, which is also called going online. When someone says a computer is online, it's just another way of saying it's connected to the Internet.



6.2 Creating user account on the internet and email:

Setting up a Gmail account is easy. You will begin by creating a Google account, and during the quick signup process you will choose your Gmail account name. In this lesson, we'll show you how to set up your Google account for Gmail, add and edit contacts, and edit your mail settings.

Setting up a Gmail account

To create a Gmail address, you'll first need to create a Google account. Gmail will redirect you to the Google account signup page. You'll need to provide some basic information like your name, birth date, gender, and location. You will also need to choose a name for your new Gmail address. Once you create an account, you'll be able to start adding contacts and adjusting your mail settings.

To create an account:

- 1. Go to <u>www.gmail.com</u>.
- 2. Click Create account.

Enter your email	
Next	
	Need help?
<u>Create account</u>	

3. The signup form will appear. Follow the directions and enter the required information.

Name					
Elena	Casarosa				
Choose your username					
EMCasarosa82	@gmail.com				
Create a password					
••••••					
Confirm your password					
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Birthday					
March 🜲 🕻	1982				

4. Review <u>Google's Terms of Service</u> and <u>Privacy Policy</u>, click the check box, then click Next step.

I agree to the Google Terms of Serv Privacy Policy	Next step
	44

5. Here, you'll have an opportunity to set up recovery options. Recovery options are helpful if you forget your password or if someone tries to access your account. If you don't want to set up recovery options at this time, click Done.

Without recovery options, you could lose access to your account if you forget your password or your account is stolen. Learn more about recovery options.
Recovery phone Add a phone
Recovery email
you@example.com
Done

6. Your account will be created, and the Google welcome page will appear.



Just like with any online service, it's important to choose a strong password—in other words, one that is difficult for someone else to guess. For more information, check out our <u>Creating Strong</u> Passwords lesson.

Signing in to your account

When you first create your account, you will be automatically signed in. Most of the time, however, you'll need to sign in to your account and sign out when you're done with it. Signing out is especially important if you're using a shared computer (for example, at a library or office) because it prevents others from viewing your emails.

To sign in:

- 1. Go to <u>www.gmail.com</u>.
- 2. Type your user name (your email address) and password, then click Sign in.



To sign out:

In the top-right corner of the page, locate the circle that has your first initial (if you've already selected an avatar image, it will show the image instead). To sign out, click the circle and select Sign out.

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le	E Change	Elena Casarosa emcasarosa82@gmail.com Privacy My Account
	Add account	Sign out

6.3 Sending a document to a given email address:

Step 1: Log in to your email account so that you are on the dashboard (front page) of your mail account.

Step 2: Click Compose. Alternatively, you can reply to an email that you've received by doubleclicking on it in your list of received emails, then following the same steps.

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	🗆 🙀 🕞 Gmail Team	Customize Gn	nail with colors and themes - To
	Gmail Team	Get Gmail on y	vour mobile phone - Access Gm

Step 3: Once your new email is open, type your recipient's email address in the 'To' field. Then put a title for your email in the 'Subject' box and type your message.

**11** -

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	My new play	
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ssages that don't appear in of	Here is my latest play - I hope you like it!	
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		_
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Step 4: Click on the paper clip icon at the bottom of the compose window.

Step 5: Browse through your Windows folders until you reach the document you want to attach to your email. Highlight this by clicking on it and then click Open. This will add the document as an attachment to your email.



Step 6: You can tell that your document has been attached to you email by its file name appearing in blue text at the bottom of the compose window.

Step 7: If you want to attach another document, click the paperclip icon again and repeat steps 4 and 5.

Promotions	My new play	_ 2 ×
	anne.hathaway@gmail.com	
	My new play	
	Hi Anne,	
s that don't appear in of	Here is my latest play - I hope you like it!	
settings.	Will	
92014 Google - <u>Terms &amp; Pri</u>		
	As you really do love it .doc (1460K)	×
	Send <u>A</u>   D + Saved	<b>i</b> -

Step 8: When you're ready to send your email, click Send.

6.4 Attaching a file to a message:

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Like all email services, Yahoo Mail supports attaching files from your <u>computer</u>, and Yahoo expands on that standard with the option to send files directly from Dropbox or Flickr. By attaching a document, rather than rewriting text into an email's body, you preserve the file's formatting. Share an image via email and you can keep the snapshot between you and the recipient, as opposed to sharing it on Twitter for all to see.

Attach a File on Your Computer

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1

Click "Compose" in Yahoo Mail to start a new message or click "Reply" on an existing email.

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2

Press the "Attach File" button, which looks like a paperclip, beneath the message either before or after writing the text of the email. Make sure your recipient notices the attachment by specifically mentioning it in your message.

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Envorites		Book2	11/26/2014 5:05 PM	Microsoft Excel W
Logitech     My Documents     My Music     My Pictures     My Videos     OneDrive				
Saved Games				
Searches		,		
File name:	"Book1" "B	ook2"	✓ All Files	n Cancel

3

Select one or more files on your <u>computer</u> and press "Open." To select multiple files, click and drag a box around them or hold "Ctrl" and click on each individually. Yahoo can send emails up to 25MB in size, including the email text itself and all attachments. The process of attaching files increases their size by about a third, so you might need to send fewer files than expected to fit in this limit.



4

Press "Send" after completing your email to send the message and attachments. To remove an attachment before sending the message, click "Remove" or "Remove All" in the attachment list beneath the message.

Attach from Dropbox or Flickr



1

Open the drop-down menu next to the "Attach File" button in a new email and pick either "Share from Dropbox" or "Share from Flickr."

Sign into Dropbox - Goo	ogle Chrome 🛛 🗕 🗖 📉
B Dropbox, Inc [US] https://www.dropbox.com/dropin	s/confirm_web_session?origin=https%3
<image/> <image/>	Sign in to Dropbox  Email  Password  Remember me  Sign in  or create an account  Cancel

# 2

Sign in to your Dropbox account if you chose "Share from Dropbox." If you're sharing images from Flickr -- owned by Yahoo -- Yahoo Mail automatically uses the Flickr images on the same Yahoo account as your email, so you don't need to log in.



3

Press "Link Account" to tie your Yahoo and Dropbox accounts together, saving you the time of logging in to Dropbox when writing future emails. Sharing from Flickr does not require this step.



## 4

Select a file from Dropbox or an image on Flickr. To select multiple items, click on each in turn. Press "Choose" -- or "OK" if using Flickr -- to attach the files to your email. After inserting files or photos, write and send your message as usual.

# Summary:

- Internet means Network of Networks. We can exchange information files through emails between the computers located at various parts of the world
- The Frame work of connecting number of computers each other is called Network
- Webpage: It is a document containing text in the internet
- Website: It is a folder in the webserver which contains different web pages
- www: It stands for World Wide Web
- http: It stands for Hyper Text Markup Language
- Browsing: It is the method used to access websites on the internet using browser software

Short Answer Type Questions:

- 1. Define the term Network?
- 2. Define Internet?
- 3. Write the steps to create an email?
- 4. Mention any three browsers for browsing internet
- 5. What are different email accounts?

Long Answer Type Questions:

- 1. Explain the creation of user account or email id on the internet?
- 2. Explain the sending of email to multiple users at a time?
- 3. Explain receiving and checking of emails?
- 4. What is the role of IT industry?

### UNIT VII

### 7. Programming Basics

### **Structure:**

7.1 Structure of a C program

- 7.2 Programming rules:
- 7.3 Character Set
- 7.4 Delimiters
- 7.5 Key Words
- 7.6 Constants
- 7.7 Variables
- 7.8 Data types
- 7.9 Operators
- 7.10 Evaluation of Expressions
- 7.11 Console I/O

### **Learning Outcomes:**

Upon competition of this unit, the learner will be able to

•	Understand the Structure of the C Programming
•	Learns the C Programming Rules
•	The basic elements to use C Programming
•	Variables, Data types used by C Programming
•	Evaluation of instructions, Expressions through Input and
Output statements	

## 7.1 Structure of a C program:

A C program contain one or more sections which are figured above. The Documentation section usually contains the collection of comment lines giving the name of the program, author's or programmer's name and few other details. The second part is the link-section which gives instruction to the compiler to connect to the various functions from the system library. The

•

Definition section describes all the symbolic-constants.

The global declaration section is used to define those variables that are used globally within the entire program and is used in more than one function. This section also declares all the user-defined functions. Then comes the main (). All C programs must have a main () which contains two parts:

Declaration part Execution part

The declaration part is used to declare all variables that will be used within the program. There needs to be at least one statement in the executable part and these two parts are declared within the opening and closing curly braces of the main ().

The execution of the program begins at the opening brace '{' and ends with the closing brace '}'. Also, it must be noted that all the statements of these two parts need to be terminated with a semi-colon.

The sub-program section deals with all user-defined functions that are called from the main (). These user-defined functions are declared and defined usually after the main () function.

Example:

```
#include<stdio.h>
#include<conio.h>
void main ()
{
    /* first C program */ printf ("Hello, World! \n");
    return;
}
```

- 7.1.2 Description of the Structure:
  - Documentations (Documentation Section)
  - Preprocessor Statements (Link Section)
  - Global Declarations (Definition Section)
  - The main () function
  - Local Declarations
  - Program Statements & Expressions
  - User Defined Functions

/* Comments */	Comments are a way of explaining what makes a program. Comments ignored by the compiler and used by others to understand the code.					
	or					
	This is a comment block, which is ignored by the compiler. Comment can be used anywhere in the program to add info about program or code block, which will be helpful for developers to easily understand the existing code in the future.					
#include <stdio.h></stdio.h>	studio is standard for input / output, this allows us to use some commands which includes a file called stdio.h. or This is a preprocessor command. that notify the compiler to include the header file stdio.h in the program before compiling the source-code.					
int/void main ()	int/void is a return value, which will be explained in a while.					
main ()	The main () is the main function where program execution begins. Every C program must contain only one main function. or This is the main function, which is the default entry point for every C program and the void in front of it indicates that it does not return a value.					
Braces	Two curly brackets "{}" are used to group all statements together.					

	or Curly braces which shows how much the main () function has its scope.
printf ()	It is a function in C, which prints text on the screen. or This is another pre-defined function of C which is used to be displayed text string in the screen.
return 0	At the end of the main function returns value 0.

# 7.2 Programming rules:

_	- All li	ines of C statements must end with a
	semicolon.	
_	- C is	case-sensitive. That is, uppercase and
	lowercase characters are different. Usually, the states	ments are typed in lowercase.
_	- A C	Program statement can be split into
	many lines or can be written in one line.	
_	- Brace	es must always match upon pairs,
	i.e., every opening brace {must have a matching close	ing brace}.
_	- All C	C program starts with void main ()
	function. 6. Comments cannot be nested. For example	e,
_	- /*	Welcome to C World, /*
	programming*/ */	
_	- Com	ment can be split into more than one
	line as per by the user preference.	

7.2.1 Execution of C Program: To write and run a C program, given steps should be followed.

Creation of Source Program –Create a C program file in various C compilers are available under MS-DOS, Turbo C Editor, Vi Editor etc.

Compilation of a C Program- Turbo C compiler is user friendly yet free and provides integrated program development environment. So, selecting key combination can do compilation. That means press Alt + F9 for compilation. On.

Program Execution- In Turbo C environment, the RUN option will do the compilation and execution of a program. Press Ctrl + F9 for execution the program.

printf () Function: Writing Data for Output

The printf () function is used to write information to console (normally computer screen). The

main structure of this function is printf (format string, list of arguments); The format String contains the following:

- Characters that can be simply printed on the screen.

- Specifications that begin with a % sign and define the output format for display of each item.
- Escape series characters that start with a  $\$  sign such as n, t, b etc.

Character	Argument	Resulting Output
c	character	A Single Character
d	integer	Signed decimal integer
S	String	Print Character Strings
f	floating Poi	int Single Floating-point

Number

scanf () Function: getting user input

scanf () function used for accepting value from the standard input device. This means that the program gets input values for variables from users. The scanf () function is a built-in C function that allows a program to accept user input from the keyboard. The structure of this function is scanf (format string &list of arguments);

Examples: -

- scanf %d , &a ;

- scanf %d %c %f, &a, &b, &c;

7.3 Character set: It denotes any alphabet, digit or special symbol used to represent information.

Use: -These characters can be combined to form variables. C uses constants, variables, operators, keywords and expressions as building blocks to form a basic C program.

Character set: - The character set is the fundamental raw material of any language and they are used to represent information. Like natural languages, computer language will also have well defined character set, which is useful to build the programs. The characters in C are grouped into the following two categories:

1. Source character set

- a. Alphabets
- b. Digits
- c. Special Characters
- d. White Spaces
- 2. Execution character set
  - a. Escape Sequence

Source character set

### **ALPHABETS**

Uppercase letters	A-Z
Lowercase letters	a-z

DIGITS-0, 1, 2, 3, 4, 5, 6, 7, 8, 9

SPECIAL CHARACTERS: (~)tilde, (%)percent sign, (l) vertical bar,(@) at symbol, (+)plus sign(<) less than (\_)underscore, ( -)minus sign, (>)greater than, (^)caret, (#)number sign,( = ) equal to (&)ampersand,(\$) dollar sign, ( /)slash, ( -left parenthesis, (\*)asterisk, (\) back slash, ) right parenthesis, (')apostrophe, (:) colon, [ - left bracket, (") quotation mark, (;) semicolon, (])right bracket, (!)exclamation mark,(,) comma, ({) left flower brace,(?) Question mark, (.)dot operator, (})right flower brace

WHITESPACE CHARACTERS:

\b- blank space

\t- horizontal tab

\v- vertical tab

\r-carriage return

\f-form feed

\n-new line

\\-Back slash

\'-Single quote

\"-Double quote

\? -Question mark

\0-Null

\a-Alarm (bell)

Execution Character Set: Certain ASCII characters are unprintable, which means they are not displayed on the screen or printer. Those characters perform other functions aside from displaying text. Examples are backspacing, moving to a newline, or ringing a bell. They are used in output statements. Escape sequence usually consists of a backslash and a letter or a combination of digits. An escape sequence is considered as a single character but a valid character constant.

These are employed at the time of execution of the program. Execution characters set are always represented by a backslash (\) followed by a character. Note that each one of character constants represents one character, although they consist of two characters. These characters combinations are called as escape sequence.

## 7.4 Delimiters

A delimiter is a unique character or series of characters that indicates the beginning or end of a specific statement, string or function body set. The following table shows the delimiter use.

Delimiter Symbols	Use			
Colon :	Useful for label			
Semicolon ;	Terminates statements			
Parenthesis ()	Used in Expression and function			
Square brackets []	used for array declaration			
Curly braces { }	Scope of statement			
Hash #	Preprocessor directive			
Comma ,	Variable separator			

Example:

```
#include<stdio.h>
```

void main()

{

int a, b, c [10];

label\_num: printf("hi");

goto label\_num:

}

## 7.5 Keywords

C programs are constructed from a set of reserved words which provide control and from libraries which perform special functions. The basic instructions are built up using a reserved set of words, such as main, for, if, while, default, double, extern, for, and int, etc., C demands that they are used only for giving commands or making statements. You cannot use default, for example, as the name of a variable. An attempt to do so will result in a compilation error.

Keywords have standard, predefined meanings in C. These keywords can be used only for their intended purpose; they cannot be used as programmer-defined identifiers. Keywords are an essential part of a language definition. They implement specific features of the language. Every C word is classified as either a keyword or an identifier. A keyword is a sequence of characters that the C compiler readily accepts and recognizes while being used in a program. Note that the keywords are all lowercase. Since uppercase and lowercase characters are not equivalent, it is possible to utilize an uppercase keyword as an identifier. The keywords are also called 'Reserved words'.

- Keywords serve as basic building blocks for program statements.
- Keywords can be used only for their intended purpose.
- Keywords cannot be used as user-defined variables.
- All keywords must be written in lowercase.
- 32 keywords available in C.

Data Types	Qualifier	User Defined	Storage Classes	Loop	Others	Decision	Jump	Derived	Function
int char float double	signed unsigned Short Long	typedef enum	auto extern register static	for while do	const volatile sizeof	If else switch case default	goto continue break	struct union	void return

# 7.6 Constants

Constants: Constants in C are fixed value that does not change during the execution of a program. Constants can be of any of the basic data types. C supports several types of constants in C language as

7.6.1 C constants

- a. Numeric Constants
  - i. Integer Constant
    - 1. Decimal Integer constant
    - 2. Octal integer constant
    - 3. Hexadecimal Integer constant
  - ii. Real Constant
- b. Character Constants
  - i. Single Character Constant
  - ii. String Constant
- c. Backslash Character constants
- d. Symbolic constants

7.6.2 Numeric constants: There are two types of numeric constants,

Integer constants

Real or floating-point constants

Integer constants Any whole number value is an integer.
An integer constant refers to a sequence of digits without a decimal point. An integer preceded by a unary minus may be considered to represent a negative constant Example: 0 -33 32767 There are three types of integer constants namely, a) Decimal integer constant Octal integer constant b) Hexadecimal integer constant c) Decimal Integer constant (base 10) It consists of any combinations of digits taken from the set 0 through 9, preceded by an optional - or + sign. The first digit must be other than 0. Embedded spaces, commas, and non-digit characters are not permitted between digits. Valid: -9999 0 32767 -23 Invalid: 12.245 - Illegal character (,) 10 20 30 - Illegal character (blank space) Octal Integer Constant (base 8) It consists of any combinations of digits taken from the set 0 through 7. If a constant contains two or more digits, the first digit must be 0. In programming, octal numbers are used. Valid: 0 037 0435 Invalid: 0786 Illegal digit 8 \_ 123 Does not begin with zero \_ 01.2 Illegal character (.) \_ Hexadecimal integer constant (base 16) It consists of any combinations of digits taken from the set 0 through 7 and a through f (either uppercase or lowercase). The letters a through f (or A through F) represent the decimal quantities 10 through 15 respectively. This constant must begin with either 0x or 0X. In programming, hexadecimal numbers are used.

Valid Hexadecimal Integer Constant: Invalid Hexadecimal Integer Constant: 0x 0X1 0x7F Unvalid Hexadecimal Integer Constant: 0xefg - Illegal character g 123 - Does not begin with 0x PAPER III

Unsigned integer constant: An unsigned integer constant specifies only positive integer value. It is used only to count things. This constant can be identified by appending the letter u or U to the end of the constant.

Valid:0u1U65535u0x233AUInvalid:-123-Only positive value

Long integer constant: A long integer constant will automatically be generated simply by specifying a constant that exceeds the normal maximum value. It is used only to count things. This constant can be identified by appending the letter l or L to the end of the constant.

Valid:	0123456L	0x123456L -1234561
Invalid:	0x1.2L	- Illegal character (.)

Short integer constant: A short integer constant specifies small integer value. This constant can be identified by appending the letter s or S to the end of the constant.

Valid: 123s -456 32767S Invalid: 12,245 - Illegal character (,) 10 20 30 - Illegal character (blank space)

Note: - A sign qualifier can be appended at the end of the constant. Usually suffixes (s or S, u or U, l or L) are not needed. The compiler automatically considers small integer constants to be of type short and large integer constants to be of type long.

Rules for constructing Integer constants

- i. An integer constant must have at least one digit.
- ii. It must not have a decimal point.
- iii. It can be either positive or negative.
- iv. If no sign precedes an integer constant, it is assumed to be positive.
- v. Commas or blanks are not allowed within an integer constant.

7.6.3 Real or Floating-point constant

Constants in C are fixed value that does not change during the execution of a program. A real constant is combination of a whole number followed by a decimal point and the fractional part. Example: 0.0083 -0.75 .95 215.

Use of Real or Floating-point constants

Integer numbers are inadequate to represent quantities that vary continuously, such as distances, heights, temperatures, prices and so on. These quantities are represented by numbers containing fractional part. Such numbers are called real or floating-point constants.

The Real or Floating-point constants can be written in two forms:

- 1. Fractional or Normal form
- 2. Exponential or Scientific form

Express a Real constant in fractional form

A real constant consists for a series of digits representing the whole part of the number, followed by a decimal point, followed by a series of representing the fractional part. The whole part or the fractional part can be omitted, but both cannot be omitted. The decimal cannot be omitted. That is, it is possible that the number may not have digits before the decimal point or after the decimal point.

Valid Real constants (Fractional): 0.0 -0.1 +123.456 .2 2. Invalid Real constant: - 1 - a decimal point is missing 1, 2.3 - Illegal character (.)

Rules for Constructing Real Constants in Fractional Form

- 1. A real constant must have at least one digit.
- 2. It must have a decimal point.
- 3. It could be either positive or negative.
- 4. Default sign is positive.
- 5. Commas or blanks are not allowed within a real constant.

Express a real constant in Exponential form

A real constant is combination of a whole number followed by a decimal point and the fractional part. If the value of a constant is either too small or too large, exponential form of representation of real constants is usually used.

In exponential form, the real constant is represented in two parts.

Mantissa - The part appearing before e, the mantissa is either a real number expressed in decimal notation or an integer.

Exponent - The part following e, the exponent is an integer with an optional plus or minus sign followed by a series of digits. The letter e separating the mantissa and the exponent can be written in either lowercase or uppercase.

Example: 0.000342 can be represented in exponential form as 3.42e-4

7500000000 can be represented in exponential form as 7.5e9 or 75E8

Rules for Constructing Real Constants in Exponential Form

1. The mantissa part and the exponential part should be separated by letter in exponential form

2. The mantissa part may have a positive or negative sign.

3. Default sign of mantissa part is positive.

4. The exponent part must have at least one digit, which must be a positive or negative integer. Default sign is positive.

5. Range of real constants expressed in exponential for is -3.4e38 to 3.4e38.

7.6.4 Character Constants: A character denotes an alphabet, digit or a special character.

Single Character constants: A single character constant or character constant is a single alphabet, a single digit or a single special symbol enclosed within single inverted commas. Both the inverted commas should point to the left.

For example, 'A' is a valid character constant whereas 'A' is not. Note that the character constant '5 is not the same as the number 5.

Valid Character Constants: m' = A'

Invalid:123'-Length should be 1

"A" - Enclosed in single quotes

Note: - Each single character constant has an integer value that is determined by the computer's character set.

Rules for Constructing Single Character constants

1. A single character constant or character constant is a single alphabet, a single digit or a single special symbol enclosed within single inverted commas. Both the inverted commas should point to the left.

2. The maximum length of a single character constant can be one character.

3. Each character constant has an integer value that is determined by the computer's character set.

7.6.5 String Constant: A character string, a string constant consists of a sequence of characters enclosed in double quotes. A string constant may consist of any combination of digits, letters, escaped sequences and spaces. Note that a character constant 'A' and the corresponding single character string constant "A" are not equivalent.

A' - Character constant - A'"A" - String Constant - A' and 0 (NULL)

The string constant "A" consists of character A and \0. However, a single character string constant does not have an equivalent integer value. It occupies two bytes, one for the ASCII code of A and another for the NULL character with a value 0, which is used to terminate all strings.

Valid String Constants: -"W""100""24, Kaja Street"Invalid String Constants: -"Wthe closing double quotes missing

Raja" the beginning double quotes missing

Rules for Constructing String constants

1) A string constant may consist of any combination of digits, letters, escaped sequences and spaces enclosed in double quotes.

2) Every string constant ends up with a NULL character which is automatically assigned (before the closing double quotation mark) by the compiler.

#### 7.7. Variables

Definition: A variable is just a named area of storage that can hold a single value (numeric or character). The C language demands that you declare the name of each variable that you are going to use and its type, or class, before you try to do anything with it.

The Programming Language C has two main variable types

- Local Variables
- Global Variables

Local Variables: Local variables scope is confined within the block or function where it is defined. Local variables must always be defined at the top of a block.

When a local variable is defined - it is not initialized by the system, you must initialize it yourself.

When execution of the block starts the variable is available, and when the block ends the variable 'dies'.

Check following example's output

```
main ()
{
    int i=4;
    int j=10;
    i++;
    if (j > 0)
    {
        /* i defined in 'main' can be seen */
printf ("i is %d\n", i);
    }
    if (j > 0)
    {
        /* 'i' is defined and so local to this block */
        int i=100;
printf ("i is %d\n", i);
```

}/\* 'i' (value 100) dies here \*/

printf ("i is %d\n", i); /\* 'i' (value 5) is now visible. \*/

}

This will generate following output

i is 5

i is 100

i is 5

Here ++ is called incremental operator and it increase the value of any integer variable by 1. Thus i++ is equivalent to i = i + 1;

You will see -- operator also which is called decremental operator and it decrease the value of any integer variable by 1. Thus i-- is equivalent to i = i - 1;

Global Variables: Global variable is defined at the top of the program file and it can be visible and modified by any function that may reference it.

Global variables are initialized automatically by the system when you define them!

Data Type Initialed int 0

char '\0'

float 0

pointer NULL

If same variable name is being used for global and local variable, then local variable takes preference in its scope. But it is not a good practice to use global variables and local variables with the same name.

```
int i=4; /* Global definition */
main ()
{
    i++; /* Global variable */
func ();
printf ("Value of i = %d -- main function\n", i);
}
```

```
func ()
```

{

int i=10; /\* Local definition \*/

i++; /\* Local variable \*/

```
printf ("Value of i = %d -- func () function\n", i);
```

}

This will produce following result

Value of i = 11 - func() function

Value of i = 5 -- main function

i in main function is global and will be incremented to 5. i in func is internal and will be incremented to 11. When control returns to main the internal variable will die and and any reference to i will be to the global.

#### 7.8. Data types

C has a concept of 'data types' which are used to define a variable before its use. The definition of a variable will assign storage for the variable and define the type of data that will be held in the location.

The value of a variable can be changed any time.

C has the following basic built-in datatypes.

– int

- float
- double
- char

Please note that there is not a Boolean data type. C does not have the traditional view about logical comparison, but that's another story.

int - data type

int innhns used to define integer numbers.

```
int Count;
```

Count = 5;

```
}
```

{

float - data type

float is used to define floating point numbers.

```
{
  float Miles;
  Miles = 5.6;
}
```

```
double - data type
```

{

double is used to define BIG floating-point numbers. It reserves twice the storage for the number. On PCs this is likely to be 8 bytes.

```
double Atoms;
Atoms = 2500000;
```

## }

char - data type

char defines characters.

```
{
    char Letter;
    Letter = 'x';
}
```

# 7.9. Arithmetic Operators

Operator	Description	Example
+	Adds two operands.	A + B = 30
_	Subtracts second operand from the first.	A - B = -10
*	Multiplies both operands.	A * B = 200
/	Divides numerator by de-numerator.	B / A = 2
%	Modulus Operator and remainder of after an integer division.	B % A = 0
++	Increment operator increases the integer value by one.	A++ = 11
	Decrement operator decreases the integer value by one.	A = 9

# Example: #include <stdio.h>

main () {

int a = 21; int b = 10; int c;
c = a + b; printf ("Line 1 - Value of c is %d\n", c);
c = a - b; printf ("Line 2 - Value of c is %d\n", c);
c = a * b; printf ("Line 3 - Value of c is %d\n", c);
c = a / b; printf ("Line 4 - Value of c is %d\n", c);
c = a % b; printf ("Line 5 - Value of c is %d\n", c);
c = a++; printf ("Line 6 - Value of c is %d\n", c);
c = a; printf ("Line 7 - Value of c is %d\n", c); }
The result: Line 1 - Value of c is 31 Line 2 - Value of c is 11 Line 3 - Value of c is 210
Line 4 - Value of c is 2 Line 5 - Value of c is 1 Line 6 - Value of c is 21 Line 7 - Value of c is 22

## 7.10 Logical Operators

Following table shows all the logical operators supported by C language. Assume variable A holds 1 and variable B holds 0, then –

Operator	Description	Example
&&	Called Logical AND operator. If both the operands are non-zero, then the condition becomes true.	(A && B) is false.
II	Called Logical OR Operator. If any of the two operands is non- zero, then the condition becomes true.	(A    B) is true.
!	Called Logical NOT Operator. It is used to reverse the logical state of its operand. If a condition is true, then Logical NOT operator will make it false.	! (A && B) is true.

```
#include <stdio.h>
main () {
 int a = 5;
 int b = 20;
 int c;
 if (a&&b) {
printf ("Line 1 - Condition is true\n");
  }
 if (a || b) {
printf ("Line 2 - Condition is true\n");
  }
 /* let's change the value of a and b */
 a = 0;
 b = 10;
 if (a&&b) {
printf ("Line 3 - Condition is true\n");
  } else {
printf ("Line 3 - Condition is not true\n");
  }
```

if (! (a && b)) {
printf ("Line 4 - Condition is true\n");
}

When you compile and execute the above program, it produces the following result -

Line 1 - Condition is true

Line 2 - Condition is true

Line 3 - Condition is not true

Line 4 - Condition is true

## 7.11 Relational operators

The following table shows all the relational operators supported by C language. Assume variable A holds 10 and variable B holds 20 then –

Operator	Description	Example
==	Checks if the values of two operands are equal or not. If yes, then the condition becomes true.	(A == B) is not true.
!=	Checks if the values of two operands are equal or not. If the values are not equal, then the condition becomes true.	(A! = B) is true.
>	Checks if the value of left operand is greater than the value of right operand. If yes, then the condition becomes true.	(A > B) is not true.
<	Checks if the value of left operand is less than the value of right operand. If yes, then the condition becomes true.	(A < B) is true.
>=	Checks if the value of left operand is greater than or equal to the value of right operand. If yes, then the condition becomes true.	(A >= B) is not true.
<=	Checks if the value of left operand is less than or equal to the value of right operand. If yes, then the condition becomes true.	(A <= B) is true.

Example:
<pre>#include <stdio.h></stdio.h></pre>
main () {
int a = 21; int b = 10; int c;
<pre>if (a == b) { printf ("Line 1 - a is equal to b\n"); } else {</pre>
<pre>printf ("Line 1 - a is not equal to b\n"); }</pre>
<pre>if (a<b) ("line="" -="" 2="" a="" b\n");="" else="" is="" less="" pre="" printf="" than="" {="" {<="" }=""></b)></pre>
<pre>printf ("Line 2 - a is not less than b\n"); }</pre>
<pre>if (a&gt;b) { printf ("Line 3 - a is greater than b\n"); } else {</pre>
<pre>printf ("Line 3 - a is not greater than b\n"); }</pre>
/* Let's change value of a and b */ a = 5; b = 20;
<pre>if (a&lt;= b) { printf ("Line 4 - a is either less than or equal to b\n"); }</pre>
<pre>if (b&gt;= a) { printf ("Line 5 - b is either greater than or equal to b\n"); }</pre>

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When you compile and execute the above program, it produces the following result -

Line 1 - a is not equal to b Line 2 - a is not less than b Line 3 - a is greater than b Line 4 - a is either less than or equal to b Line 5 - b is either greater than or equal to b

# 7.12 Precedence's Assignment

Operator precedence determines the grouping of terms in an expression and decides how an expression is evaluated. Certain operators have higher precedence than others; for example, the multiplication operator has a higher precedence than the addition operator.

For example, x = 7 + 3 \* 2; here, x is assigned 13, not 20 because operator \* has a higher precedence than +, so it first gets multiplied with 3\*2 and then adds into 7.

Here, operators with the highest precedence appear at the top of the table, those with the lowest appear at the bottom. Within an expression, higher precedence operators will be evaluated first.

Category	Operator	Associativity
Postfix	() [] -> . ++	Left to right
Unary	+ - ! ~ ++ (type)* & sizeof	Right to left
Multiplicative	* / %	Left to right
Additive	+ -	Left to right
Shift	<<>>	Left to right
Relational	<<= >>=	Left to right
Equality	== !=	Left to right

Bitwise AND	&	Left to right
Bitwise XOR	^	Left to right
Bitwise OR	1	Left to right
Logical AND	&&	Left to right
Logical OR	II	Left to right
Conditional	?:	Right to left
Assignment	= += -= *= /= %=>>= <<= &= ^=  =	Right to left
Comma	,	Left to right

# Example

Try the following example to understand operator precedence in C –

#include <stdio.h>

main () {

int a = 20; int b = 10; int c = 15; int d = 5; int e;

e = (a + b) \* c / d; // (30 \* 15) / 5printf ("Value of (a + b) \* c / d is: %d\n", e);

e = ((a + b) \* c) / d; // (30 \* 15) / 5printf ("Value of ((a + b) \* c) / d is: %d\n", e); e = (a + b) \* (c / d); // (30) \* (15/5)printf ("Value of (a + b) \* (c / d) is: %d\n", e);

e = a + (b \* c) / d; // 20 + (150/5)printf ("Value of a + (b \* c) / d is: %d\n", e);

```
return 0;
```

When you compile and execute the above program, it produces the following result -

Value of (a + b) \* c / d is: 90 Value of ((a + b) \* c) / d is: 90 Value of (a + b) \* (c / d) is: 90 Value of a + (b \* c) / d is: 50

7.13 Increment, Decrement operators

Increment Operators are used to increase the value of the variable by one and Decrement Operators are used to decrease the value of the variable by one in C programs.

Both increment and decrement operator are used on a single operand or variable, so it is called as a unary operator. Unary operators are having higher priority than the other operators it means unary operators are executed before other operators.

Syntax ++ // increment operator -- // decrement operator Note: Increment and decrement operators are cannot apply on constant.

Example x= 4++; // gives error, because 4 is constant Type of Increment Operator pre-increment post-increment pre-increment (++ variable)

In pre-increment first increment the value of variable and then used inside the expression (initialize into another variable).

Syntax

```
++ variable;
Example pre-increment
#include<stdio.h>
#include<conio.h>
void main ()
{
int it;
i=10;
x = ++i;
printf ("x: %d", x);
printf ("i: %die);
getch ();
}
Output
x: 11
i: 11
In above program first increase the value of i and then used value of i into expression.
```

```
post-increment (variable ++)
```

In post-increment first value of variable is used in the expression (initialize into another variable) and then increment the value of variable.

```
Syntax
variable ++;
Example post-increment
#include<stdio.h>
#include<conio.h>
void main ()
{
int it;
i=10;
x=i++;
printf ("x: %d", x);
printf ("i: %die);
getch ();
}
Output
x: 10
```

## i: 11

In above program first used the value of i into expression then increase value of i by 1.

Type of Decrement Operator pre-decrement post-decrement Pre-decrement (-- variable) In pre-decrement first decrement the value of variable and then used inside the expression (initialize into another variable).

Syntax -- variable; Example pre-decrement #include<stdio.h> #include<conio.h>

In above program first decrease the value of i and then value of i used in expression.

post-decrement (variable --) In Post-decrement first value of variable is used in the expression (initialize into another variable) and then decrement the value of variable.

Syntax variable --; Example post-decrement #include<stdio.h> #include<conio.h>

```
void main ()
{
    int x,i;
    i=10;
    x=i--;
    printf("x: %d",x);
    printf("i: %d",i);
    getch();
    }
    Output
    x: 10
    i: 9
    In above program first used the value of x in expression then decrease value of i by 1.
```

Example of increment and decrement operator increment and decrement operator Example #include<stdio.h> #include<conio.h>

```
void main()
{
    int x,a,b,c;
    a = 2;
    b = 4;
    c = 5;
    x = a-- + b++ - ++c;
    printf("x: %d",x);
    getch();
    }
    Output
    x: 0
```

## 7.14 Evaluation of expressions

In c language expression evaluation is mainly depends on priority and associativity.

Priority

This represents the evaluation of expression starts from "what" operator.

# Associativity

It represents which operator should be evaluated first if an expression is containing more than one operator with same priority.

Operator	Priority	Associativity
{}, (), []	1	Left to right
++,, !	2	Right to left
*, /, %	3	Left to right
+, -	4	Left to right
<, <=, >, >=, ==, !=	5	Left to right
&&	6	Left to right
II	7	Left to right
?:	8	Right to left
=, +=, -=, *=, /=, %=	9	Right to left

Example 1:



### Example 2:



#### 7.15 Console I/O

C programming has several in-built library functions to perform input and output tasks.

Two commonly used functions for I/O (Input/Output) are printf() and scanf().

The scanf() function reads formatted input from standard input (keyboard) whereas the printf() function sends formatted output to the standard output (screen).

```
Example #1: C Output
#include <stdio.h> //This is needed to run printf() function.
int main()
{
    printf("C Programming"); //displays the content inside quotation
    return 0;
}
Output
```

```
C Programming
How this program works?
```

All valid C program must contain the main() function. The code execution begins from the start of main() function.

The printf() is a library function to send formatted output to the screen. The printf() function is declared in "stdio.h" header file.

Here, stdio.h is a header file (standard input output header file) and #include is a preprocessor directive to paste the code from the header file when necessary. When the compiler encounters printf() function and doesn't find stdio.h header file, compiler shows error.

The return 0; statement is the "Exit status" of the program. In simple terms, program ends.

```
Example #2: C Integer Output
```

```
#include <stdio.h>
int main()
{
    int testInteger = 5;
    printf("Number = %d", testInteger);
    return 0;
}
Output
```

```
Number = 5
```

Inside the quotation of printf() function, there is a format string "%d" (for integer). If the format string matches the argument (testInteger in this case), it is displayed on the screen.

```
Example #3: C Integer Input/Output
#include <stdio.h>
int main()
{
    int testInteger;
    printf("Enter an integer: ");
    scanf("%d",&testInteger);
    printf("Number = %d",testInteger);
    return 0;
}
```

```
Output
```

```
Enter an integer: 4
```

Number = 4

The scanf() function reads formatted input from the keyboard. When user enters an integer, it is stored in variable testInteger.

```
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```

Note the '&' sign before testInteger; &testInteger gets the address of testInteger and the value is stored in that address.

```
Example #3: C Floats Input/Output
#include <stdio.h>
int main()
{
  float f;
  printf("Enter a number: ");
// %f format string is used in case of floats
  scanf("%f",&f);
  printf("Value = %f", f);
  return 0;
}
Output
Enter a number: 23.45
Value = 23.450000
The format string "%f" is used to read and display formatted in case of floats.
Example #4: C Character I/O
#include <stdio.h>
int main()
{
  char chr;
  printf("Enter a character: ");
  scanf("%c",&chr);
  printf("You entered %c.",chr);
  return 0;
}
Output
Enter a character: g
```

You entered g. Format string %c is used in case of character types.

Little bit on ASCII code

When a character is entered in the above program, the character itself is not stored. Instead, a numeric value(ASCII value) is stored.

```
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```

And when we displayed that value using "%c" text format, the entered character is displayed.

```
Example #5: C ASCII Code
#include <stdio.h>
int main()
{
    char chr;
    printf("Enter a character: ");
    scanf("%c",&chr);
```

// When %c text format is used, character is displayed in case of character types
printf("You entered %c.\n",chr);

// When %d text format is used, integer is displayed in case of character types
printf("ASCII value of %c is %d.", chr, chr);
return 0;

```
}
```

```
Output
```

Enter a character: g You entered g. ASCII value of g is 103. The ASCII value of character 'g' is 103. When, 'g' is entered, 103 is stored in variable var1 instead of g. You can display a character if you know ASCII code of that character. This is shown by following example.

```
Example #6: C ASCII Code

#include <stdio.h>

int main()

{

int chr = 69;

printf("Character having ASCII value 69 is %c.",chr);

return 0;

}

Output
```

Character having ASCII value 69 is E. More on Input/Output of floats and Integers Integer and floats can be displayed in different formats in C programming.

```
Example #7: I/O of Floats and Integers
#include <stdio.h>
int main()
{
    int integer = 9876;
    float decimal = 987.6543;
    // Prints the number right justified within 6 columns
    printf("4 digit integer right justified to 6 column: %6d\n", integer);
    // Tries to print number right justified to 3 digits but the number is not right adjusted because
    there are only 4 numbers
    printf("4 digit integer right justified to 3 column: %3d\n", integer);
    // Rounds to two digit places
    printf("Floating point number rounded to 2 digits: %.2f\n",decimal);
```

// Rounds to 0 digit places
printf("Floating point number rounded to 0 digits: %.f\n",987.6543);

```
// Prints the number in exponential notation(scientific notation)
printf("Floating point number in exponential form: %e\n",987.6543);
return 0;
```

}

Output

4 digit integer right justified to 6 column: 9876 4 digit integer right justified to 3 column: 9876 Floating point number rounded to 2 digits: 987.65 Floating point number rounded to 0 digits: 988 Floating point number in exponential form: 9.876543e+02

7.16 Formatted and Unformatted Functions

Unformatted Input/Output: Unformatted Input/output is the most basic form of input/output. Unformatted input/output transfers the internal binary representation of the data directly between memory and the file.

Formatted output- Converts the internal binary representation of the data to ASCII characters

which are written to the output file. Formatted input reads characters from the input file and converts them to internal form. Formatted I/O can be either "Free" format or "Explicit" format, as described below.

Advantages and Disadvantages of Unformatted I/O- Unformatted input/output is the simplest and most efficient form of input/output. It is usually the most compact way to store data. Unformatted input/output is the least portable form of input/output. Unformatted data files can only be moved easily to and from computers that share the same internal data representation. It should be noted that XDR (external Data Representation) files, described in Portable Unformatted Input/Output, can be used to produce portable binary data. Unformatted input/output is not directly human readable, so you cannot type it out on a terminal screen or edit it with a text editor.

Advantages and Disadvantages of Formatted I/O -Formatted input/output is very portable. It is a simple process to move formatted data files to various computers, even computers running different operating systems, if they all use the ASCII character set. (ASCII is the American Standard Code for Information Interchange. It is the character set used by almost all current computers, with the notable exception of large IBM mainframes.) Formatted files are human readable and can be typed to the terminal screen or edited with a text editor.

However, formatted input/output is more computationally expensive than unformatted input/output because of the need to convert between internal binary data and ASCII text. Formatted data requires more space than unformatted to represent the same information. Inaccuracies can result when converting data between text and the internal representation.

## **Summary:**

- The C Programming was invented by Dennis Ritchie
- It is a high-level programming language
- It has huge popularity of having many operating systems, networking and security features incorporated in it
- The C Programming is a Structured oriented programming
- The Structure of the C Program defines its format and flow of the logic
- The evaluation of Expression is an important part of any language process
- The formats of the I/O functions help to resolve the functionalities of the C Programming

## **Short Answer Questions:**

- 1. What is the structure of a C Program
- 2. Define Constants and Variables
- 3. What are Arithmetic and Logical operators
- 4. Explain increment, decrement operators
- 5. What is Console I/O

## **UNIT VIII**

#### Structure:

- 8.1 Decision and Loop Control Statements
- 8.2 Loop and Control Structures
- 8.3 While Loop
- 8.4 For Loop
- 8.5 Do...While Loop
- 8.6 Nested Loop

#### **Learning Objectives**

Upon competition of this unit, the learner will be able to:

- Understand the importance of decision and loop control structures
- The Loop and Control Structures flow of information in a program
- Various Conditional and loop control structures

#### **8.1 Decision Control Statements**

In decision control statements (if-else and nested if), group of statements are executed when condition is true. If condition is false, then else part statements are executed.

There are 3 types of decision making control statements in C language. They are,

if statements

if else statements

nested if statements

"IF", "ELSE" AND "NESTED IF" DECISION CONTROL STATEMENTS IN C:

Syntax for each C decision control statements are given in below table with description.

Decision Control Statements	Syntax / Description
If	if (condition)
	{
	Statements;
	}
	Description:
	In these type of statements, if condition is

	true, then respective block of code is
	executed.
If Else	Syntax:
	if (condition)
	{
	Statement1;
	Statement2;
	}
	else
	{
	Statement3;
	Statement4;
	}
	Description:
	In these type of statements, group of
	statements are executed when condition is
	true. If condition is false, then else part
	statements are executed.

# **EXAMPLE PROGRAM FOR IF STATEMENT IN C:**

In "if" control statement, respective block of code is executed when condition is true.

int main()

```
{
    int m=40,n=40;
    if (m == n)
    {
        printf("m and n are equal");
    }
}
```

```
OUTPUT: m and n are equal
```

# EXAMPLE PROGRAM FOR IF ELSE STATEMENT IN C:

In C if else control statement, group of statements are executed when condition is true. If condition is false, then else part statements are executed.

```
#include <stdio.h>
int main()
{
    int m=40,n=20;
    if (m == n)
    {
        printf("m and n are equal");
    }
    else
    {
        printf("m and n are not equal");
    }
}
```

OUTPUT: m and n are not equal

## EXAMPLE PROGRAM FOR NESTED IF STATEMENT IN C:

In "nested if" control statement, if condition 1 is false, then condition 2 is checked and statements are executed if it is true.

If condition 2 also gets failure, then else part is executed.

```
#include <stdio.h>
int main()
{
    int m=40,n=20;
    if (m>n) {
    printf("m is greater than n");
    }
```

```
else if(m<n) {
printf("m is less than n");
}
else {
printf("m is equal to n");
}</pre>
```

OUTPUT: m is greater than n

## **8.2 Loop Control Statements**

You may encounter situations, when a block of code needs to be executed several number of times. In general, statements are executed sequentially: The first statement in a function is executed first, followed by the second, and so on.

Programming languages provide various control structures that allow for more complicated execution paths.

A loop statement allows us to execute a statement or group of statements multiple times. Given below is the general form of a loop statement in most of the programming languages –



C programming language provides the following types of loops to handle looping requirements.

S.No.	Loop Type & Description
1	while loop Repeats a statement or group of statements while a given condition is true. It tests the condition before executing the loop body.
2	<b>for loop</b> Executes a sequence of statements multiple times and abbreviates the code that manages the loop variable.
3	<b>dowhile loop</b> It is more like a while statement, except that it tests the condition at the end of the loop body.
4	<b>nested loops</b> You can use one or more loops inside any other while, for, or dowhile loop.

Loop Control Statements

Loop control statements change execution from its normal sequence. When execution leaves a scope, all automatic objects that were created in that scope are destroyed.

C supports the following control statements.

S.No.	Control Statement & Description
1	break statement
	Terminates the <b>loop</b> or <b>switch</b> statement and transfers execution to the statement immediately following the loop or switch.
2	<b>continue statement</b> Causes the loop to skip the remainder of its body and immediately retest its condition prior to reiterating.
3	go to statement Transfers control to the labeled statement.

The Infinite Loop

A loop becomes an infinite loop if a condition never becomes false. The **for** loop is traditionally used for this purpose. Since none of the three expressions that form the 'for' loop are required, you can make an endless loop by leaving the conditional expression empty.

#include <stdio.h>

```
int main () {
  for(;;) {
    printf("This loop will run forever.\n");
  }
  return 0;
}
```

When the conditional expression is absent, it is assumed to be true. You may have an initialization and increment expression, but C programmers more commonly use the for(;;) construct to signify an infinite loop.

**NOTE** – You can terminate an infinite loop by pressing Ctrl + C keys.

**8.3 While Loop:** A **while** loop in C programming repeatedly executes a target statement as long as a given condition is true.

Syntax: The syntax of a while loop in C programming language is -

```
while(condition) {
   statement(s);
}
```

Here, **statement**(**s**) may be a single statement or a block of statements. The **condition** may be any expression, and true is any nonzero value. The loop iterates while the condition is true.

When the condition becomes false, the program control passes to the line immediately following the loop.

Flow Diagram



Here, the key point to note is that a while loop might not execute at all. When the condition is tested and the result is false, the loop body will be skipped and the first statement after the while loop will be executed.

Example
```
#include <stdio.h>
int main () {
    /* local variable definition */
    int a = 10;
    /* while loop execution */
    while( a < 20 ) {
        printf("value of a: %d\n", a);
        a++;
    }
    return 0;
}</pre>
```

When the above code is compiled and executed, it produces the following result -

value of a: 10 value of a: 11 value of a: 12 value of a: 13 value of a: 14 value of a: 15 value of a: 16 value of a: 17 value of a: 18 value of a: 19

**8.4 FOR Loop:** A **for** loop is a repetition control structure that allows you to efficiently write a loop that needs to execute a specific number of times.

#### Syntax

The syntax of a **for** loop in C programming language is –

```
for ( init; condition; increment ) {
   statement(s);
}
```

Here is the flow of control in a 'for' loop -

- The **init** step is executed first, and only once. This step allows you to declare and initialize any loop control variables. You are not required to put a statement here, as long as a semicolon appears.
- Next, the **condition** is evaluated. If it is true, the body of the loop is executed. If it is false, the body of the loop does not execute and the flow of control jumps to the next statement just after the 'for' loop.
- After the body of the 'for' loop executes, the flow of control jumps back up to the **increment** statement. This statement allows you to update any loop control variables. This statement can be left blank, as long as a semicolon appears after the condition.
- The condition is now evaluated again. If it is true, the loop executes and the process repeats itself (body of loop, then increment step, and then again condition). After the condition becomes false, the 'for' loop terminates.



# Example

#include <stdio.h></stdio.h>
int main (){
int a;
/* for loop execution */

```
for( a =10; a <20; a = a +1){
    printf("value of a: %d\n", a);
}
return0;
}</pre>
```

When the above code is compiled and executed, it produces the following result -

value of a: 10 value of a: 11 value of a: 12 value of a: 13 value of a: 14 value of a: 15 value of a: 16 value of a: 17 value of a: 18 value of a: 19

**8.5 Do...While Loop:** Unlike **for** and **while** loops, which test the loop condition at the top of the loop, the **do...while** loop in C programming checks its condition at the bottom of the loop.

A **do...while** loop is like a while loop, except the fact that it is guaranteed to execute at least one time.

Syntax

The syntax of a do...while loop in C programming language is -

```
do {
   statement(s);
} while( condition );
```

Notice that the conditional expression appears at the end of the loop, so the statement(s) in the loop executes once before the condition is tested.

If the condition is true, the flow of control jumps back up to do, and the statement(s) in the loop executes again. This process repeats until the given condition becomes false.

Flow Diagram





```
#include <stdio.h>
int main ()
{
    /* local variable definition */
    int a = 10;
    /* do loop execution */
    do {
        printf("value of a: %d\n", a);
        a = a + 1;
    }while( a < 20 );
}</pre>
```

When the above code is compiled and executed, it produces the following result –

value of a: 10 value of a: 11 value of a: 12 value of a: 13 value of a: 14 value of a: 15 value of a: 16 value of a: 17 value of a: 18 value of a: 19

**8.6 Nested Loops:** C programming allows to use one loop inside another loop. The following section shows a few examples to illustrate the concept.

Syntax

The syntax for a nested for loop statement in C is as follows -

```
for ( init; condition; increment ) {
   for ( init; condition; increment ) {
     statement(s);
   }
   statement(s);
}
```

The syntax for a nested while loop statement in C programming language is as follows -

```
while(condition) {
    while(condition) {
        statement(s);
    }
    statement(s);
}
```

The syntax for a nested do...while loop statement in C programming language is as follows -

```
do {
   statement(s);
   do {
     statement(s);
   }while( condition );
}while( condition );
```

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A final note on loop nesting is that you can put any type of loop inside any other type of loop. For example, a 'for' loop can be inside a 'while' loop or vice versa.

Example

#include <stdio.h>

The following program uses a nested for loop to find the prime numbers from 2 to 100 -

```
int main () {
    /* local variable definition */
    int i, j;
    for(i = 2; i<100; i++) {
        for(j = 2; j <= (i/j); j++)
        if(!(i%j)) break; // if factor found, not prime
        if(j > (i/j)) printf("%d is prime\n", i);
    }
    return 0;
}
```

When the above code is compiled and executed, it produces the following result -

2 is prime 3 is prime 5 is prime 7 is prime 11 is prime 13 is prime 17 is prime 19 is prime

23 is prime
29 is prime
31 is prime
37 is prime
41 is prime
43 is prime
47 is prime
53 is prime
59 is prime
61 is prime
67 is prime
71 is prime
73 is prime
79 is prime
83 is prime
89 is prime
97 is prime

## **Summary:**

The decision and loop control structures help the user to understand the flow of instructions to solve various mathematical and logical problems.

# **Short Answer Type Questions:**

- 1. What is If...Else statement explain with example?
- 2. What is Go to Continue Statement?
- 3. Define Switch Statement?
- 4. What are nesting of loops?

#### UNIT IX

#### 9. Arrays and Strings

#### **Structure:**

- 9.1 Arrays
- 9.2 Arrays Declaration and Initialization of Strings
- 9.3 Accessing of Array Elements
- 9.4 Character Arrays
- 9.5 Declaration and initialization of strings

#### 9.1 Arrays:

Arrays a kind of data structure that can store a fixed-size sequential collection of elements of the same type. An array is used to store a collection of data, but it is often more useful to think of an array as a collection of variables of the same type.

Instead of declaring individual variables, such as number0, number1, ..., and number99, you declare one array variable such as numbers and use numbers[0], numbers[1], and ..., numbers[99] to represent individual variables. A specific element in an array is accessed by an index.

All arrays consist of contiguous memory locations. The lowest address corresponds to the first element and the highest address to the last element.



Declaring Arrays

To declare an array in C, a programmer specifies the type of the elements and the number of elements required by an array as follows –

```
type arrayName [ arraySize ];
```

This is called a *single-dimensional* array. The **arraySize** must be an integer constant greater than zero and **type** can be any valid C data type. For example, to declare a 10-element array called **balance** of type double, use this statement –

```
double balance[10];
```

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Here balance is a variable array which is sufficient to hold up to 10 double numbers.

Initializing Arrays

You can initialize an array in C either one by one or using a single statement as follows -

double balance[5] = {1000.0, 2.0, 3.4, 7.0, 50.0};

The number of values between braces {} cannot be larger than the number of elements that we declare for the array between square brackets [].

If you omit the size of the array, an array just big enough to hold the initialization is created. Therefore, if you write –

double balance [] = {1000.0, 2.0, 3.4, 7.0, 50.0};

You will create the same array as you did in the previous example. Following is an example to assign a single element of the array –

balance [4] = 50.0;

The above statement assigns the  $5^{th}$  element in the array with a value of 50.0. All arrays have 0 as the index of their first element which is also called the base index and the last index of an array will be total size of the array minus 1. Shown below is the pictorial representation of the array we discussed above –



Accessing Array Elements

An element is accessed by indexing the array name. This is done by placing the index of the element within square brackets after the name of the array. For example –

double salary = balance [9];

The above statement will take the  $10^{th}$  element from the array and assign the value to salary variable. The following example Shows how to use all the three above mentioned concepts viz. declaration, assignment, and accessing arrays –



```
int n [10]; /* n is an array of 10 integers */
int i, j;
/* initialize elements of array n to 0 */
for (i = 0; i < 10; i++) {
    n [i] = i + 100; /* set element at location i to i + 100 */
    }
    /* output each array element's value */
    for (j = 0; j < 10; j++) {
        printf("Element[%d] = %d\n", j, n[j]);
    }
    return 0;
}</pre>
```

When the above code is compiled and executed, it produces the following result -

Element [0] = 100Element [1] = 101Element [2] = 102Element [3] = 103Element [4] = 104Element [5] = 105Element [6] = 106Element [7] = 107Element [8] = 108Element [9] = 109 **9.2 Arrays Declaration and Initialization of Strings:** Strings are one-dimensional array of characters terminated by a **null** character '\0'. Thus, a null-terminated string contains the characters that comprise the string followed by a **null**.

The following declaration and initialization create a string consisting of the word "Hello". To hold the null character at the end of the array, the size of the character array containing the string is one more than the number of characters in the word "Hello."

char greeting  $[6] = \{ 'H', 'e', 'l', 'l', 'o', '\0' \};$ 

0

If you follow the rule of array initialization, then you can write the above statement as follows -

-

char greeting [] = "Hello";

.

Following is the memory	presentation	of the above	defined string in	C/C++ -

Index			-	5		-
Variable	н	e	Т	I	o	\0
Address	0x23451	0x23452	0x23453	0x23454	0x23455	0x23456

You do not place the *null* character at the end of a string constant. The C compiler automatically places the '\0' at the end of the string when it initializes the array. Let us try to print the abovementioned string –

```
#include <stdio.h>
int main () {
    char greeting [6] = {'H', 'e', 'I', 'I', 'o', '\0'};
printf ("Greeting message: %s\n", greeting);
return 0;
```

When the above code is compiled and executed, it produces the following result -

Greeting message: Hello

C supports a wide range of functions that manipulate null-terminated strings -

Sr.No.	Function & Purpose
1	strcpy (s1, s2);
	Copies string s2 into string s1.
2	strcat (s1, s2);
	Concatenates string s2 onto the end of string s1.
3	strlen(s1);
	Returns the length of string s1.
4	strcmp (s1, s2);
	Returns 0 if s1 and s2 are the same; less than 0 if s1 <s2; 0="" greater="" if="" s1="" than="">s2.</s2;>
5	strchr (s1, ch);
	Returns a pointer to the first occurrence of character ch in string s1.
6	strstr (s1, s2);
	Returns a pointer to the first occurrence of string s2 in string s1.

The following example uses some of the above-mentioned functions -

#include <stdio.h>
#include <string.h>
int main () {
 char str1[12] = "Hello";
 char str2[12] = "World";
 char str3[12];
int len;

```
/* copy str1 into str3 */
strcpy (str3, str1);
printf ("strcpy (str3, str1): %s\n", str3);
    /* concatenates str1 and str2 */
strcat (str1, str2);
printf ("strcat (str1, str2): %s\n", str1);
    /* total length of str1 after concatenation */
    len = strlen(str1);
    printf("strlen(str1): %d\n", len);
    return 0;
```

When the above code is compiled and executed, it produces the following result -

strcpy (str3, str1): Hello strcat (str1, str2): HelloWorld strlen(str1): 10

#### 9.3 Accessing Array Elements:

#### Accessing Array

}

- 1. We all know that array elements are randomly accessed using the subscript variable.
- 2. Array can be accessed using array-name and subscript variable written inside pair of square brackets [].

Consider the below example of an array -



In this example we will be accessing array like this -

arr[3] = Third Element of Arrayarr[5] = Fifth Element of Arrayarr[8] = Eighth Element of Array

whereas elements are assigned to an array using below way -

arr[0] = 51arr[1] = 32arr[2] = 43arr[3] = 24arr[4] = 5arr[5] = 26

Program #1 : Accessing array

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int arr[] = {51,32,43,24,5,26};
    int i;
    for(i=0; i<=5; i++) {
        printf("\nElement at arr[%d] is %d",i,arr[i]);
        }
    getch();
}</pre>
```

# Output :

Element at arr[0] is 51 Element at arr[1] is 32 Element at arr[2] is 43 Element at arr[3] is 24 Element at arr[4] is 5 Element at arr[5] is 26

#### How a[i] Works?

We have following array which is declared like this -

int arr[] = { 51,32,43,24,5,26};

As we have elements in an array, so we have track of base address of an array. Below things are important to access an array –

#### **Expression Description**

#### Example

arr	It returns the base address of an array	Consider 2000
*arr	It gives zeroth element of an array	51
*(arr+0)	It also gives zeroth element of an array	51
*(arr+1)	It gives first element of an array	32

So whenever we tried accessing array using arr[i] then it returns an element at the location \*(arr + i)

Accessing array a[i] means retrieving element from address (a + i).

We have listed out some of our observations and conclusions

arr[i] = 5 \*(arr+i) = 5 \*(i+arr) = 5 i[arr] = 5

all of the above notations yields same result. lets prove it using below program -

#### Program #2 : Accessing array

#include <stdio.h></stdio.h>
#include <conio.h></conio.h>
void main()
{
int arr[] = {51,32,43,24,5,26};
int i;
<b>for</b> (i=0; i<=5; i++) {
printf("\n%d %d %d %d",arr[i],*(i+arr),*(arr+i),i[arr]);
}
getch();
}

#### **Output :**

51 51 51 51			
32 32 32 32			
43 43 43 43			
24 24 24 24			
5555			
26 26 26 26			

# 9.4 Character Arrays

**String** is a sequence of characters that is treated as a single data item and terminated by null character 'W'. Remember that C language does not support strings as a data type. A **string** is actually one-dimensional array of characters in C language. These are often used to create meaningful and readable programs.

**For example:** The string "hello world" contains 12 characters including '<u>O</u>' character which is automatically added by the compiler at the end of the string.

# Declaring and Initializing a string variables

PAPER III

There are different ways to initialize a character array variable.

char name[13]="StudyTonight";// valid character array initialization

char name[10]={'L','e','s','o','n','s','\0'};// valid initialization

Remember that when you initialize a character array by listing all of its characters separately then you must supply the '0' character explicitly.

Some examples of illegal initialization of character array are,

char ch[3]="hell";// Illegal

char str[4]; str="hell";// Illegal

# **String Input and Output**

Input function scanf() can be used with %s format specifier to read a string input from the terminal. But there is one problem with scanf() function, it terminates its input on the first white space it encounters. Therefore if you try to read an input string "Hello World" using scanf() function, it will only read **Hello** and terminate after encountering white spaces.

However, C supports a format specification known as the **edit set conversion code %**[..] that can be used to read a line containing a variety of characters, including white spaces.

```
#include<stdio.h>
#include<stdio.h>
#include<stdio.h>
void main()
{
    char str[20];
    printf("Enter a string");
    scanf("%[^\n]",&str);//scanning the whole string, including the white spaces
    printf("%s",str);
    }
    Another method to read character string with white spaces from terminal is by using
    the gets()function.
```

```
char text[20];
gets(text);
```

```
printf("%s", text);
```

# **String Handling Functions**

C language supports a large number of string handling functions that can be used to carry out many of the string manipulations. These functions are packaged in **string.h** library. Hence, you must include **string.h** header file in your programs to use these functions.

The following are the most commonly used string handling functions.

Method	Description
strcat()	It is used to concatenate(combine) two strings
strlen()	It is used to show length of a string
strrev()	It is used to show reverse of a string
strcpy()	Copies one string into another
strcmp()	It is used to compare two string

strcat() function

strcat("hello","world");

strcat() function will add the string "world" to "hello" i.e it will ouputhelloworld.

strlen() function

strlen() function will return the length of the string passed to it.

int j;

j =strlen("studytonight");

printf("%d",j);

## 12

strcmp() function

strcmp() function will return the ASCII difference between first unmatching character of two strings.

```
int j;
j =strcmp("study","tonight");
printf("%d",j);
```

-1

```
strcpy() function
```

It copies the second string argument to the first string argument. #include<stdio.h> #include<string.h>

```
int main()
```

## {

char s1[50]; char s2[50];

strcpy(s1,"StudyTonight");//copies "studytonight" to string s1
strcpy(s2, s1);//copies string s1 to string s2

```
printf("%s\n", s2);
```

return(0);

}

```
StudyTonight
```

strrev() function

It is used to reverse the given string expression.

#include<stdio.h>

```
int main()
```

```
{
```

```
char s1[50];
```

printf("Enter your string: "); gets(s1); printf("\nYour reverse string is: %s",strrev(s1)); return(0); } Enter your string: studytonight

Your reverse string is: thginotyduts

## 9.5 Declaration and Initialization of Strings:

#### **Declaration of string**

Syntax

charvariable\_name[size];

Example

char name[10];
char city[20];

## **Initialization of string**

There are multiple ways we can initialize a string.

## Direct initialization

If we assign string directly with in double quotes, no need to bother about null character.

Because compiler will automatically assign the null character at the end of string.

```
i)Assigning direct string with size
```

```
char country[6]="india";
```

#### Note

while giving initial size, we should always give extra one size to store null character.

To store "india", string size 5 is enough but we should give extra one (+1) size 6 to store null character.

In general to store N character string, we should create N+1 size char array.

# *ii)Assigning direct string without size*

Example

char country[]="india";

In the above case, string size will be determined by compiler.

Character by character initialization

we can also assign a string character by character.

If we assign character by character , we must specify the null character  $\0'$  at the end of the string.

i)char by char with size

Example

**char** country[**6**]={'i','n','d','i','a','\**0**'};

*ii)char by char without size* 

Example

**char** country[]={ 'i', 'n', 'd', 'i', 'a', '\**0**' };

## **Pictorial Explanation**



All four methods are perfectly valid.

#### **Summary:**

The Arrays and Strings of C Programming are basic elements of the communication of strings with the computer. By knowing the array initialization, accessing of elements of the array we can solve multiple and complex problems in mathematics.

# **Short Answer Type Questions:**

- 1. What is an array declaration in C?
- 2. Describe the declaration of 2D Array?
- 3. Explain the steps to access Character array elements?
- 4. Describe declaration and initialization of strings ?

# PRINTING TECHNOLOGY I YEAR THEORY PAPER - I

# DTP & PRE PRESS-1

# **BLUE PRINT**

**PERIODS PER WEEK : 4** 

**PERIODS PER YEAR : 135** 

S.NO.	Name of the UNIT	NO.OF PERIODS	WEIGHTAGE IN MARKS	SHORT ANSWER QUESTIONS	ESSAY TYPE QUESTIONS
Ι	Design for Printing	25	18	3	2
II	Desktop Publishing	25	16	2	2
III	Colour Separation	25	10	2	1
IV	Image Assembly	60	24	3	3
	Total	135			

# PRINTING TECHNOLOGY I YEAR THEORY PAPER - II

# PRESS WORK & FINISHING – I

# **BLUE PRINT**

# **PERIODS PER WEEK : 4**

# **PERIODS PER YEAR : 135**

S.NO.	Name of the UNIT	NO.OF PERIODS	WEIGHTAGE IN MARKS	SHORT ANSWER QUESTIONS	ESSAY TYPE QUESTIONS
Ι	Printing Processes	50	26	4	3
II	Offset Press Operations	45	16	2	2
III	Gravure Printing	15	10	2	1
IV	Print Finishing for Publications	25	16	2	2
	Total	135			

# PRINTING TECHNOLOGY I YEAR THEORY PAPER – III

# **INTRODUCTION TO COMPUTER SYSTEM**

# **BLUE PRINT**

# PERIODS PER WEEK : 4 PERIODS PER YEAR : 135

S.No	Name of the unit	No. <b>of</b> periods	Weight age in Marks	Short Answer Questions	Essay type Questions
1.	Introduction to computer system	15	8	1	1
2.	Advance windows features	20	10	2	1
3.	Features of Word Processing Package	15	8	1	1
4.	Features of Excel Package	15	8	1	1
5.	Features of power point presentation Package	10	8	1	1
6.	Usage of Internet	10	8	1	1
7.	C-Programming Basics	20	8	1	1
8.	Decision and loop control statements	20	8	1	1
9.	Arrays and Strings	10	2	1	0
	Total	135			

#### MODEL QUESTION PAPAER

# PRINTING TECHNOLOGY I YEAR -THEORY PAPER-I

# DTP & PRE-PRESS – I

Time : 3 Hours

Max. Marks : 50

# SECTION-A

I.	Note :		(i)	Answer all questions.	
			<b>(ii</b> )	Each question carries 2 marks	2x10=20
	1.	1. What is Legibility?			
	2.	2. Write about WYSIWYG?			
	3. What are the three basic rules of Typography?				
	4.	4. What is the function of Keyboard? Name different types of Keys?			
	5.	What	is MS-	-DOS?	
	6.	Defin	ne Addi	tive Colours?	
	7.	What	is Dou	ble split complementary?	
	8.	What	is Sign	nature?	
	9.	What	is Pres	s proof?	
	10.	0. What is Golden rod paper?			
				SECTION-B	

# II. Note : (i) Answer any 5 questions.

#### (ii) Each question carries 6 marks

- 11. Explain the Characteristics of a Design?
- 12. Explain different kinds of Layout and their method of Preperation?
- 13. Give a description of various kinds of output devices and Explain the working of Inkjet, Dotmatrix printers?
- 14. Explain about OCR and state its advantages?
- 15. Explain Basic colour theory?
- 16. Explain any two types of equipments and four kinds of tools used for image assembling?
- 17. Explain the rules of imposition?
- 18. Explain Layout Proof and Screen Proof?

5x6=30

# MODEL QUESTION PAPER PRINTING TECHNOLOGY I YEAR -THEORY PAPER-II PREWORK & FINISHING- I

#### Time : 3 Hours

Max. Marks: 50

2x10=20

5x6=30

#### SECTION-A

#### I. Note : (i) Answer all questions.

- (ii) Each question carries 2 marks
- 1. Write differences between light platen and heavy platen?
- 2. State the principles of single revolution presses.
- 3. Write the principle of flexography.
- 4. What is length of repeat?
- 5. Explain about dampening unit.
- 6. Write about perfecting presses.
- 7. Write the purpose of Doctor Blade.
- 8. State the purpose of Slitting Machine?
- 9. What is Punching?
- 10. State the advantages of Drilling?

## **SECTION-B**

#### II. Note : (i) Answer any 5 questions.

(ii) Each question carries 6 marks

11. Explain the different types of Flexographic Printing Machine and how do they function?

- 12. Classify Letterpresses machines and explain them?
- 13. Compare contrast between letterpress and lithography?
- 14. Explain about construction of a Sheetfed presses?
- 15. Mention about plate, rubber and impressions cylinders and their purpose?
- 16. Mention how solvent recovery is done in gravure printing presses?
- 17. Explain the various binding operations that is carried out in book section?
- 18. Explain Automation in binding?

# MODEL QUESTION PAPER PRINTING TECHNOLOGY I YEAR -THEORY PAPER-III

#### **INTRODUCTION TO COMPUTER SYSTEM**

Time : 3 Hours

Max. Marks : 50

2x10=20

5x6=30

#### SECTION-A

- I. Note : (i) Answer all questions.
  - (ii) Each question carries 2 marks
  - 1. What are the various components of a computer system?
  - 2. What is modem? Give any two examples of modems?
  - 3. What is meant by defragmentation?
  - 4. What is mail merge?
  - 5. What is a cell? How many rows and columns are available in MS-Excel Worksheet?
  - 6. Define the term Slide ?
  - 7. Define the term Network?
  - 8. Describe the Structure of a C Program?
  - 9. Write the Control Statements in C?
  - 10. Define Array and give example?

#### **SECTION-B**

- II. Note : (i) Answer any 5 questions.
  - (ii) Each question carries 6 marks
  - 11. List out the differences between hardware and software?
  - 12. Describe installing a new software using control panel?
  - 13. Mention the different text alignments used in MS- Word?
  - 14. What are different types of functions in MS-Excel? Discuss?
  - 15. Describe how to create a new presentation?
  - 16. Explain creation of User account or Email ID on the internet?
  - 17. Explain the Arithematic Operations using C Program?
  - 18. State and explain the use of if, if-else, Nested if-else, break and continue statements